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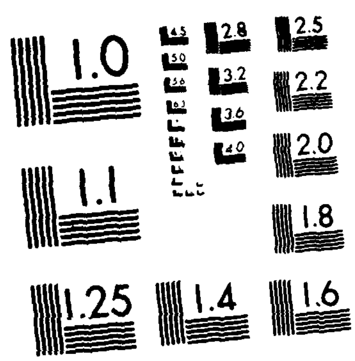

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Waste Minimization Program

Air Force Plant 6

AD-A191 838

Prepared for:

U.S. Air Force System Command
Aeronautical Systems Division/PMD
Wright-Patterson, AFB, OH 45433

Contract -F09603-84-G-1462-SC01

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This report presents the findings of an assessment of hazardous waste minimization opportunities at Air Force Plant 6. This assessment was based upon a site investigation at the manufacturing plant, discussions with operators and subsequent analyses. Recommendations are made regarding methods to reduce the volume of hazardous waste disposed.

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Air Force Plant 6

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This report was prepared by the Earth Technology Corporation under Contract Number F09603-84-G-1462-SC01 for the AFSC, Aeronautical Systems Division (ASD/PMD). Mr. Charles H. Alford was the Project Officer for ASD/PMD. Mr. Richard R. Pannell was Program Manager and Mr. Brian J. Burgher, P.E., Mr. Douglas Hazelwood and Mr. Eric Hillenbrand were principal investigators for The Earth Technology Corporation.

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The Earth Technology Corporation project team acknowledges the invaluable assistance, input and cooperation of a number of organizations, including ASD/PMD, the Air Force Plant 6 Air Force Plant Representative Office, and the AFP 6 facility contractor--Lockheed-Georgia Company. The project team also acknowledges the many equipment and technology vendors that shared their knowledge and experience to support this analysis of waste minimization opportunities.

1.0 INTRODUCTION

This report presents the findings of an assessment of Waste Minimization opportunities at Air Force Plant 6 in Marietta, Georgia. It is part of the Waste Minimization Program being conducted by the Air Force Systems Command, Aeronautical Systems Division/Facilities Management Division (ASD/PMD) for eight (8) Government-Owned, Contractor-Operated (GOCO) facilities to promote prudent waste management by exploiting opportunities to reduce costs and conserve resources.

A project team completed a site investigation of Lockheed operations during the weeks of July 22-26 and September 2-6, 1985 to review facility operations and discuss opportunities for waste reduction with plant engineering staffs. Based upon this investigation and subsequent analyses, this report presents the status of current waste generation and minimization programs and recommends other potential methods for reducing current waste volumes. Tables of waste volumes before and after minimization have been prepared to provide an indication of planned and projected waste reduction possible through system modifications. Finally, recommendations for implementation of opportunities which could further reduce waste generation and disposal are provided.

1.1 BACKGROUND

Interest in waste minimization has long been promoted by Federal legislation, including the Federal Water Pollution Control Act Amendments of 1972, the Energy Policy and Conservation Act of 1975 and the Used Oil Recycling Act as well as DOD directives such as AFR 78-22 and DODD 19-14. More recently, the impetus for waste minimization has become even stronger. The reauthorization of RCRA includes bans on landfilling of certain waste types and a request for certification that waste minimization is being conducted by hazardous waste generators. Similarly, DOD has issued directives requiring zero land disposal of solvents by October, 1986, through its Used Solvent Elimination Program.

ASD/PMD anticipated these developments and initiated programs in 1983 to address these issues. A preliminary identification of resource conservation and recovery activities and opportunities was included in an environmental audit program conducted in 1983 for fifteen (15) facilities. ASD/PMD contracted a further study of resource conservation and recovery opportunities at eleven (11) GOCO facilities in 1984. This effort resulted in a preliminary assessment of opportunities for industrial and non-industrial (i.e., solid or municipal wastes) waste streams.

The methodology for this effort relied primarily on data acquired during the environmental audit program conducted in 1983 supplemented with conversations and information exchanges between the study team and GOCO contractor personnel. The results of this investigation were an indication of the areas where resource conservation and recovery opportunities appeared to be most substantial, and the areas where opportunities were not promising. Through application of a consistent methodology, facilities with substantial opportunities were identified, so that opportunities warranting further investigation could be identified.

The 1984 study demonstrated that plant operators were implementing methods that could substantially reduce waste generation volumes and raw material requirements to reduce their waste management costs and potential liabilities associated with waste land disposal. However, other opportunities for waste minimization were identified which appeared both technologically and economically feasible but were not being implemented.

In light of the findings of these studies and the new certification requirements of RCRA, ASD/PMD is adopting a Waste Minimization Program. The program will promote prudent waste management by exploiting opportunities to reduce costs and conserve resources. It is intended to establish for ASD/PMD the status of progress in this area, and to demonstrate facility advances in prudent waste management. In addition, it is expected that new opportunities not previously considered will be identified for possible implementation.

1.2 OBJECTIVES

The ASD/PMD Waste Minimization Program is designed to promote waste management opportunities which reduce the reliance on land disposal by GOCO facilities and which result in increased efficiency in the utilization of resources. As a part of this program, this study has the following objectives:

1. Define the status of waste generation and existing minimization concepts at AFP 6.

2. Support feasible alternatives identified at AFP 6 by Lockheed.

3. Identify and evaluate new opportunities not being implemented at AFP 6.

4. Stimulate technology transfer between AFP 6 and other Air Force GOCO facilities as well as with other DOD installations.

5. Continue to increase the awareness of the importance of waste minimization.

6. Provide information needed to confidently certify that waste minimization is being employed at AFP 6 to satisfy RCRA requirements and DOD directives.

2.0 CONCLUSIONS AND RECOMMENDATIONS

Air Force Plant 6, located in Marrietta, Georgia, is operated by Lockheed-Georgia Company. Operations at AFP 6 cover approximately 720 acres. Lockheed currently has approximately 18,300 employees engaged in C-5B production and C-5A and C-130 maintenance/operations.

Lockheed generates significant quantities of wastes as a result of machining, surface preparation, surface coating, assembly, testing and maintenance operations. In 1984, Lockheed generated 549,390 gallons of waste requiring off-site treatment or disposal at an approximate cost of $419,000. Off-site disposal is expected to increase substantially as 192,000 gal/yr of industrial wastewater sludge, previously disposed on-site, is sent off-site for disposal.

Measures now in place at AFP 6 are resulting in significant reductions in off-site land disposal requirements. Additional planned changes being incorporated by Lockheed are expected to further reduce the use of off-site treatment and land disposal in future years. These rates could potentially be reduced further through additional measures.

A summary of the conclusions, recommendations and economics resulting from an investigation of waste minimization opportunities at McDonnell Douglas and Rockwell is provided below.

2.1 CONCLUSIONS

This section presents a summary of the waste minimization measures being incorporated by Lockheed, as well as alternatives being considered as part of waste minimization initiatives at AFP 6 and alternatives requiring further investigation, development or capital resources prior to incorporation.

A summary of 1984 waste disposal volumes, currently planned reductions and additional potential reductions being considered by Lockheed is provided in Table 2-1. A brief description of reduction methods is provided in Table 2-2. An analysis of these data results in the following conclusions:

1. Measures now in place at AFP 6 have achieved significant reductions in land disposal requirements. Reductions of approximately 70 percent are attributable to the following in-place measures:

TABLE 2-1. SUMMARY OF WASTE
MINIMIZATION PROGRAM -- AFP 6

	WASTE STREAM	1984 GENERATION (POUNDS)	1984 LAND DISPOSAL (POUNDS)	PROJECTED LAND DISPOSAL W/PLANNED MINIMIZATION(1) (POUNDS)	PROJECTED LAND DISPOSAL W/PROPOSED MINIMIZATION (POUNDS)
1.	Machine Coolant Waste	2,070,000	0	0	0
2.	Engine Oil & Hydraulic Fluid Waste	200,000	0	0	0
3.	Paint Sludge	301,000	301,000	301,000	226,000 (90,400)(2)
4.	Paint & Thinner Waste	130,000	0	0	0
5.	Trichloroethylene Waste	53,700	0	0	0
6.	1,1,1-Trichloro-ethane Waste	60,100	0	0	0
7.	Fuel Waste	639,000	0	0	0
8.	Spent Salt Baths	54,200	54,200	54,200	54,200
9.	Chem Mill Waste	2,960,000	0	0	0
10.	Chem Mill Maskant Waste	4,750	0	0	0
11.	Cyanide Waste	920	920	0	0
12.	IWT Sludge	1,780,000	1,780,000	890,000	668,000 (249,000)(2)
13.	Sealant Waste	61,600	61,000	61,600	61,000
14.	Fire Fighting Foam Waste	2,890	2,890	2,890	2,890
	TOTALS	8,318,160	2,200,610	1,309,690	1,012,690 (458,090)(2)
	% REDUCTION	--	--	40%	54% (79%)(2)

(1) Includes approved and/or funded minimization measures.
(2) Figures in parenthesis represent reductions achievable through on-site high-temperature incineration.

TABLE 2-2. SUMMARY OF
CURRENT, PLANNED AND RECOMMENDED
WASTE MANAGEMENT METHODS AT
AFP 6

WASTE STREAM	PRESENT METHOD(1)	PLANNED CHANGES(2)	RECOMMENDED CHANGES
1. Machine Coolant Waste	On-site IWT System	1) Change coolant 2) Partial recycle	1) Evaluate centralized coolant recycling 2) Evaluate use of chip wringer 3) Improve coolant management
2. Engine Oil & Hydraulic Fluid Waste	Off-site recycle	None	Increased on-site recycle
3. Paint Sludge	Landfill disposal	None	Evaluate on-site treatment
4. Paint & Thinner Waste	Incineration and off-site recycle	None	On-site recycling
5. Trichloroethylene Waste	Incineration and off-site recycle	None	1) Reduce VOC losses 2) On-site recycling
6. 1,1,1-Tri-chloroethane Waste	Off-site recycle and incineration	None	On-site recycling
7. Fuel Waste	Off-site recycle	None	On-site use as fuel supplement
8. Spent Salt Baths	Landfill disposal	None	None
9. Chem Mill Waste	Off-site treatment	None	Evaluate milling rate decrease and on-site recycling
10. Chem Mill Maskant Waste	Incineration	None	None
11. Cyanide Waste	Landfill disposal	Changed to non-CN processes	None
12. IWT Sludge	On-site landfill disposal	1) Off-site landfilling 2) Improve dewatering	1) Evaluate ultra-filtration 2) Evaluate cationic coagulants
13. Sealant Waste	Landfill disposal	None	None
14. Fire Fighting Foam Waste	Landfill disposal	None	None

(1) "Present Method" listed is as of December 1984.
(2) "Planned Changes" are approved, funded or already implemented measures.

1. Over one million gallons per year of concentrated chemical wastes are treated on-site by Lockheed.

2. Machine coolants are treated on-site to achieve a 249,000 gal/year reduction in disposal requirements.

3. Approximately 96,000 gal/yr of contaminated solvents and fuels are recycled off-site under contract to Lockheed.

2. Measures already approved or implemented are expected to result in a 40 percent decrease in AFP 6 land disposal of hazardous waste from 1984 levels. These include:

   1. Replacement of on-site treatment system vacuum filters with efficient sludge presses is expected to reduce sludge generation by approximately 96,000 gal/yr.

   2. Plant-wide switchover to a more efficient coolant and the partial recycling of coolant are expected to further decrease sludge generation.

   3. Flow reduction and capacity increase renovations are expected to reduce treatment plant sludge generation significantly.

   4. A previous changeover to noncyanide cadmium plating will eliminate the generation of 120 gal/yr of cyanide solids.

3. Additional opportunities have been identified by Lockheed and during the course of this study which could reduce off-site treatment and disposal requirements by an additional 14 percent. These are as follows:

   1. Plantwide coolant recycling could almost eliminate coolant flows to the waste treatment plant resulting in lower sludge generation rates.

   2. The life of hydraulic fluids could be extended through a plantwide oil maintenance program to reduce off-site recycling by 20,250 gal/yr.

   3. Waste paint sludge could potentially be treated on-site to reduce generation rates by approximately 8,000 gal/yr.

4. Waste solvents (methyl ethyl ketone, trichloroethane and 1,1,1-trichloroethane) could be recycled on-site for reuse to achieve a 17,000 gal/year reduction in off-site disposal and recycling.

5. Almost 80,000 gal/yr of contaminated fuels could be used on-site as supplemental boiler fuels in lieu of off-site recycling.

6. Chem mill wastes could potentially be recycled on-site to reduce off-site disposal by 370,000 gal/yr.

7. Treatment plant sludge generation could be reduced by 24,000 gal/year or more through the use of ultrafiltration and cationic coagulants.

An additional reduction in land disposal rates of approximately 25 percent could be achieved through the on-site incineration of organic residues and IWT sludges.

2.2 RECOMMENDATIONS

Based on the findings of this waste minimization investigation of Lockheed operations at AFP 3, the following is an inventory of recommendations made with the objective of minimizing current waste disposal.

1. <u>Machine Coolant Waste</u>

    1. Evaluate the feasibility of a plantwide coolant recovery system including a chip wringer or other drainage system.

    2. Evaluate the use of deionized water for coolant makeup.

    3. Obtain a coolant analyzer for use in tracking coolant quality.

    4. Evaluate the on-site incineration of recovered tramp oils.

2. <u>Engine Oil and Hydraulic Fluid Waste</u>

    1. Acquire portable systems equipped with water removal features for the routine, in-situ maintenance of machine hydraulic oils.

2. Implement a hydraulic oil maintenance program with routine purification of all plant hydraulic oils in the new portable systems.

3. Analyze oils periodically to verify quality and establish appropriate purification intervals.

4. Dedicate the existing oil filtration systems to the largest (or most problematic) hydraulic systems and operate the systems full time.

5. Evaluate the on-site incineration of engine oils and nonrecyclable hydraulic fluids.

3. <u>Paint Sludge</u>

1. Investigate the use of detackification chemicals and on-site sludge dewatering to reduce total volumes.

2. Evaluate on-site incineration of waste paint sludge.

4. <u>Paint & Thinner Waste</u>

1. Provide improved segregation at waste accumulation points to allow complete segregation of recyclable solvents.

2. Provide paint gun cleanup stations at all painting booths.

3. Educate workers on the importance of proper waste segregation.

4. Delegate responsibility for waste segregation to line management.

5. Conduct routine checks to identify accumulation points where proper segregation is not being accomplished.

6. If nonsegregation is detected, employ management initiatives to correct problems.

7. Acquire a distillative recovery system and storage tank for on-site methyl ethyl ketone (MEK) recovery.

8. Utilize recovered MEK for equipment cleanup and, if it can meet mil specs, operations requiring high purity MEK.

9. Evaluate the recovery of other waste solvents using the system acquired for MEK.

10. Evaluate on-site incineration of nonrecyclable waste paints and thinners.

5. <u>Trichloroethylene Waste</u>

1. Evaluate the condition of degreaser covers and repair damaged and poorly fitting covers.

2. Train employees in the importance of judicious cover use.

3. Post signs at each degreaser mandating judicious cover use.

4. Delegate responsibility for cover use to line management.

5. Conduct routine spot checks to verify routine cover use.

6. Evaluate crane entry/exit speeds and train operators in proper speed control.

7. Train employees in proper loading rates.

8. Train employees in proper spray system use.

9. Evaluate the potential for consolidation of degreasing operations.

10. Segregate waste TCE from other materials as described in item 4.

11. Acquire a distillation and bulk storage system for the on-site recovery and reuse of TCE.

12. Develop low-cost solvent analysis techniques to be used to verify the purity of recycled solvents.

13. Assign one employee full-time responsibility for AFP 6 solvent segregation and recovery programs.

6. 1,1,1-Trichloroethane Waste

   1. Segregate waste TCA from other materials as described in item 4.

   2. Acquire a distillation and bulk storage system for TCA recovery.

   3. Develop an analysis program to verify the purity of recovered TCA and any additive deficiencies.

   4. Replenish spent additives in recovered TCA, as necessary.

   5. Assign one employee full-time responsibility for AFP 6 solvent segregation and recovery programs.

7. Fuel Waste

   1. Evaluate the on-site reuse of waste fuels as supplemental boiler fuels.

   2. Evaluate use of waste fuels as incinerator fuels.

8. Chem Mill Waste

   1. Evaluate chem milling operations to determine if higher free aluminum concentrations can be tolerated in the chem milling operation.

   2. Determine the long-term utility of a chem mill solution recovery system.

   3. If economically justifiable, expeditiously acquire a chem mill solution recycling system.

9. IWT Sludge

   1. Continue with planned dewatering system improvements.

   2. Continue with planned flow reduction efforts.

   3. Evaluate the economics and benefits of increased concentrated industrial waste storage capacity.

   4. Evaluate the use of ultrafiltration techniques in the oily industrial waste system.

   5. Evaluate the replacement of ferrous sulfate with high-performance cationic coagulants.

   6. Evaluate on-site incineration of IWT sludges.

2.3 ECONOMICS

Table 2-3 summarizes the economics of some of the waste minimization measures developed through this investigation. Economics are order of magnitude estimates only and should not be used in place of detailed engineering estimates which consider contractor labor, engineering and administration costs and facility specific costs. Where costs were not available from Lockheed, estimates are based on standard cost references, vendor quotes or experience with similar capital projects.

TABLE 2-3
APP 6: LOCKHEED
POTENTIAL WASTE MINIMIZATION ECONOMICS

WASTE	OPTION	CAPITAL COST	ANNUAL O&M COST	INCREASED ANNUAL SAVINGS
1. Machine Coolant Waste	Mobile Plate Filtration	$ 10,000	$ 4,000	$ 3,700
2. Hydraulic Oil Waste	Mobile Oil Purification	$ 28,000	$13,500	$ 23,960
3. Paint Sludge	On-Site Treatment	N/A	N/A	N/A
4. Paint & Thinner Waste	On-Site Recycling	$ 37,900	$ 7,300	$ 95,200
5. Trichloroethylene Waste	1) On-Site Recycling	$ 15,000	$ 4,400	$ 30,000
	2) Cover Repair	N/A	0	$ 12,500
	3) Increased Cover Use	0	0	$ 10,500
	4) Improved Practices	0	0	$ 15,800
6. 1,1,1-Trichloro-ethane Waste	On-Site Recycling	$ 15,000	$ 3,700	$ 15,300
7. Fuel Waste	Use as Boiler Fuel	$140,000		
8. Chem Mill Waste	1) Crystallization Recovery	$979,000	$24,000	$ 490,000
	2) Lime Precip. Recovery	$1,257,000	$231,000	$ 283,000
9. IWT Sludge	1) Increase IWC Storage Capacity	N/A	N/A	$ 15,000
	2) Ultrafiltration of IWO	N/A	N/A	$ 18,000
	3) Cationic Coagulants	N/A	N/A	N/A
10. Solvent Vapors	Vapor Recovery and Reuse	N/A	N/A	N/A
11. Organic Residues	On-site Incineration	$3,200,000	$350,000	None

*N/A indicates data not available.

3.0 WASTE MINIMIZATION PROGRAM
AFP 6 - LOCKHEED

This section provides a description of current waste generation and management practices by waste stream at AFP 6 - Lockheed-Georgia Company. A summary of these current practices is provided in Table 3-1. The following subsections present detailed descriptions of each waste stream and current management methods; waste stream material balances (where appropriate); opportunities for waste minimization; system economics; and recommendations for system implementation. Section 3.16 provides an evaluation of on-site incineration of several of the waste streams. This information is provided in support of the conclusions and recommendations summarized in Section 2. Work sheets for each waste stream are included in Appendix B.

3.1 MACHINE COOLANT WASTES

3.1.1 Waste Description and Management Practices

Machining operations at AFP 6 require soluble oil/water emulsion coolants for lubrication and cooling of aluminum parts during metalworking. After prolonged use of the coolant, it is degraded, as evidenced by ineffective lubrication, rancidity and free-floating tramp oils. These spent coolants are removed from machine sumps by portable vacuum trucks and subsequently drained to the AFP 6 Oily Industrial Waste (IWO) treatment system.

Figure 3-1 presents annual coolant use data for AFP 6 machining operations. Lockheed currently uses Union 10-B water soluble coolant. A typical make-up of the coolant is:

- o 60-90% mineral oil
- o 1-5% water
- o 5-30% emulsifiers
- o 1-20% coupling agents
- o 1-10% rust inhibitors
- o 0-10% bactericide (generally chlorophenols).

Coolant is mixed with water to a 20:1 (water:oil) ratio prior to addition to the machine sumps. Waste coolants pumped from machine sumps typically contain this water:oil ratio with 2 to 3 percent tramp oil and high solids content.

Based on purchase records, it is estimated that Lockheed used 332,200 gallons of coolant/water emulsion in 1984. Assuming a typical industrial operating loss rate of 25 percent through evaporation and dragout, an estimated 249,150 gal/yr of used coolant are discharged to the IWO system for treatment.

TABLE 3-1
AFP# 6 WASTE GENERATION RATES AND MANAGEMENT PRACTICES

WASTE	SOURCE/CONTENT	1984 GENERATION RATE	CURRENT MANAGEMENT PRACTICES	CURRENT* COSTS	CHANGES PROJECTED/COMMENTS
1. Machine Coolant Waste	Metal Working Machines -95% Water -5% Coolant	2,066,700 lbs (249,000 gal)	Piped to on-site treatment system	N/A	Change in coolants expected to increase life three-fold
2. Engine Oil & Hydraulic Fluid Waste	Metal Working Machines and Vehicle Maintenance -90% Hydraulic Oils -10% Motor Oil	200,000 lbs (25,000 gal)	Stored in drums Drum transport Off-site recycle by Arivec	$ 3,750 (revenue)	None
3. Paint Sludge	Paint Booth Sumps -30% Solids -30% Water -10% Polyvinyl Acetate -10% Arcylic Resin -10% Inorganic Compounds	301,000 lbs (33,440 gal)	Stored in drums Drum transport Lanfill disposal by Chem Waste	$112,800	None
4. Paint & Thinner Waste	Part Degreasing and Paint Cleanup -70% Mixed ketones -15% TCA -15% TCE & Other Solvents	129,600 lbs (19,200 gal)	Stored in drums Drum transport Incineration by Chem Waste (73%) Off-site recycle by Arivec (27%)	$ 21,600 (net)	Projected 1985 rate is 30% lower than 1984
5. Trichloroethylene Waste	Vapor Degreasers	53,680 lbs (4,400 gal)	Stored in drums Drum transport Off-site recycle by Arivec (57%) Incineration by Chem Waste (43%)	$ 5,520 (net)	None
6. 1,1,1-Trichloroethane Waste	Hand-Applied Cleaning	60,120 lbs (5,465 gal)	Stored in drums Drum transport Off-site recycle by Arivec (96%) Incineration by Chem Waste (4%)	$ 100 (net)	None

*Unit costs are provided in Appendix A.
N/A indicates data not available.

TABLE 3-1 (Cont'd)
AFP# 6 WASTE GENERATION RATES AND MANAGEMENT PRACTICES

WASTE	SOURCE/CONTENT	1984 GENERATION RATE	CURRENT MANAGEMENT PRACTICES	CURRENT* COSTS	CHANGES PROJECTED/COMMENTS
7. Fuel Waste	Aircraft Fueling -99.9% JP4 & 5 -0.1% Kerosene	638,600 lbs (79,820 gal)	Stored in drums Drum transport Off-site use as fuel by Arivec	$ 35,920 (revenue)	None
8. Spent Salt Baths	Heat Treat and Paint Stripping -Kolene No. 5 -Tempering C -Draw Temp 430	54,150 lbs** (3,245 gal)	Stored in drums Drum transport Landfill disposal by Chem Waste	$ 3,600	None
9. Chem Mill Waste	Aluminum Chem Mill -48% Water -10% NaOH - 8% Aluminum -34% Smut & Other non-volatiles	2,960,000 lbs** (370,000 gal)	Bulk storage in clarifier Bulk railcar transport Bulk treatment by DuPont	$232,000	None
10. Chem Mill Maskant Waste	Aluminum Pre-mill Masking Operations -Toluene -Xylene -ABS Rubber	4,750 lbs** (600 gal)	Drum storage Drum transport Incineration by Chem Waste	$ 880	One-time waste generation
11. Cyanide Waste	Tank Cleanout -Cadmium -CN Sludge	920 lbs** (115 gal)	Drum storage Drum transport Landfill disposal by Chem Waste	$ 177	One-time waste generation Cyanide eliminated from processs

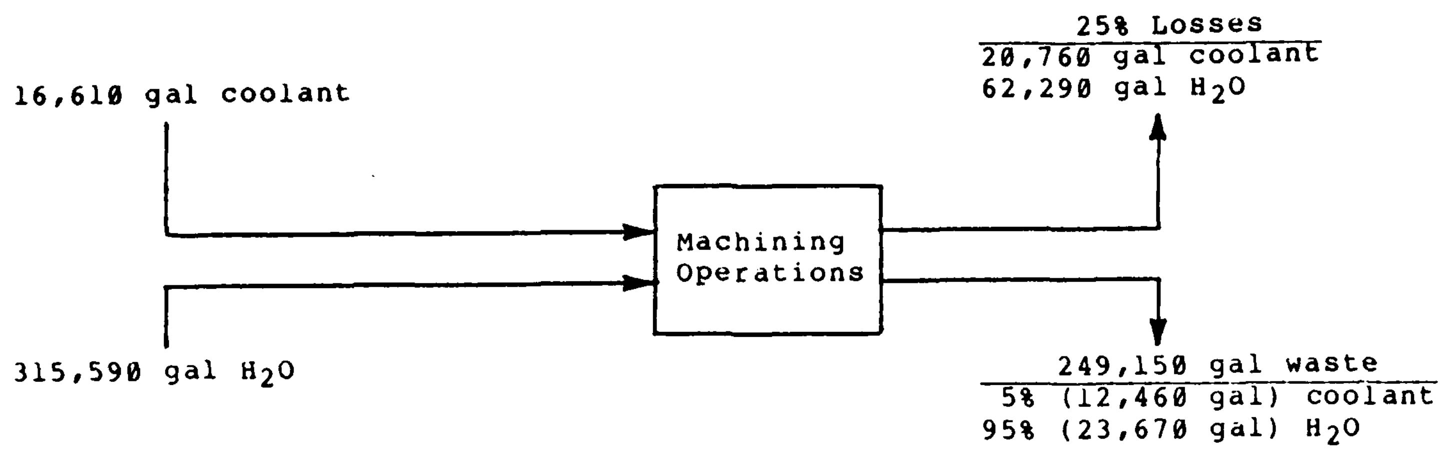
*Unit costs are provided in Appendix A.
**Generation rate based on first 6 months of 1985. None generated in 1984.

TABLE 3-1 (Cont'd)
AFP# 6 WASTE GENERATION RATES AND MANAGEMENT PRACTICES

WASTE	SOURCE/CONTENT	1984 GENERATION RATE	CURRENT MANAGEMENT PRACTICES	CURRENT* COSTS	CHANGES PROJECTED/COMMENTS
12. IWT Sludge	Wastewater Treatment Plant -43% Water -20% Solids -12% Oils -17% FeO_2 - 8% SiO_2	1,776,000 lbs (192,000 gal)	Bulk on-site disposal in lagoon	N/A	Lagoon closed. Will begin transporting off-site for chemical waste landfilling. Planned filter presses will reduce rates by approximately 50%
13. Sealant Waste	Fuel Tank Sealing -Cans -Applicators -Rags -Hardened Sealant	61,600 lbs (7,700 gal)	Drum storage Drum transport Landfill disposal *by Chem Waste*	$9,160	
14. Fire Fighting Foam Waste	Fire Fighting System -65% Water -25% Butyl Carbitol -.01 mg/l 2,4-Dinitrophenol	2,890 lbs (330 gal)	Drum storage Drum transport Landfill disposal by GSX	$1,260	One-time waste generation

*Unit costs are provided in Appendix A.
N/A indicates data not available.

FIGURE 3-1
ANNUAL MACHINE COOLANT USE



System Costs

Treatment:	249,150 gal @ $0.10/gal*	=	$ 24,915/year
Coolant:	16,610 gal @ $3.09/gal	=	51,340/year
Water:	315,600 gal @ $0.65/1000-gal	=	205/year
	TOTAL ANNUAL COST		$ 76,460

*Treatment cost based on Earth Technology estimates. Actual unit costs are not available.

The IWO system, shown schematically in Figure 3-2, employs physical skimming, air flotation, ferrous sulfate coagulation, gravity separation and pH adjustment to achieve treatment. Sludge is piped to the sludge treatment system for dewatering, effluent is discharged to the local sanitary sewer system and collected oils are burned on-site in a small dedicated oil incinerator.

Actual IWO system operating and maintenance (O&M) costs are not available. However, assuming O&M costs of $0.10/gal, coolant disposal costs of $24,900/yr are calculated. As shown in Figure 3-1, total coolant management costs of $76,460/yr are estimated.

3.1.2 Waste Minimization Opportunities

3.1.2.1 Use of Alternate Coolants

Lockheed has recently initiated efforts to institute a plant-wide switchover from the Union 10-B coolant now in use to Trimsol brand coolant. Trimsol was once used throughout AFP 6, however, a change to Union was made several years ago in an effort to reduce operating costs. Since the changeover, experience has shown that although the Union coolant costs considerably less ($3.09/gal versus approximately $7.70/gal for Trimsol), Lockheed estimates that its life expectancy is roughly one-quarter that of Trimsol in small machines and one-half in larger sumps.

It is estimated that coolant waste generation will decrease by approximately 60 percent as a result of the planned changeover to Trimsol. Assuming that losses remain constant at 83,050 gal/yr, total coolant usage would decrease by approximately 45 percent. It is estimated that coolant waste generation after switchover will be approximately 99,000 gal/yr. Although coolant purchase costs would increase by approximately $12,000/yr, a net coolant management cost decrease of $3,000/year is projected, due to decreased coolant treatment demands. Actual savings would probably be greater as machine down-time and coolant changeout costs would also be decreased.

3.1.2.2 Coolant Recycling

Lockheed has recently funded installation of a Lockheed-owned coolant recovery system. The coolant recovery system is planned to service four large machines with combined sump volumes of 12,474 gallons. The system, an ALCMO model AC10-600DR Cyclonic Filtration System, is designed to increase coolant life by removing swarf and aerating the

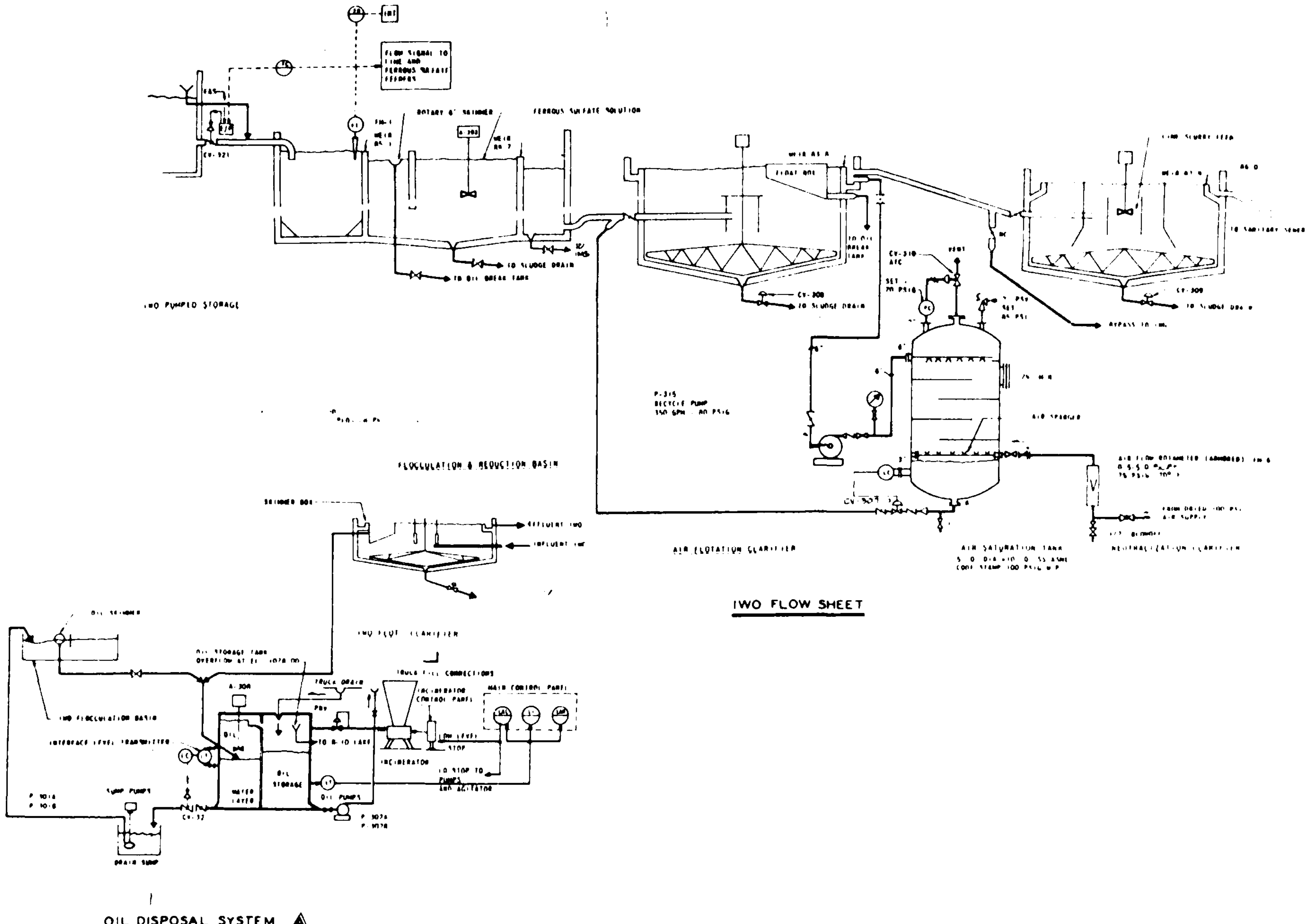


FIGURE 3-2. AFP 6 OILY INDUSTRIAL WASTE TREATMENT SYSTEM

filtered coolant. Used coolant is automatically removed from the sumps of the four machines and transferred to a 600-gallon tank where large and heavy particles settle out and are removed by a moving drag flight conveyor. The system is designed to further purify the coolant by removing metallic and nonmetallic particles down to 5 microns in size through cyclonically-induced density separation. The coolant aeration which occurs during cyclonic filtration will reportedly prevent bacterial growth, the major cause of coolant failure at AFP 6.

ALMCO claims that the system extends coolant life as much as 16 times. An annual cost savings of $11,000 has been calculated based on the following assumptions:

1. Trimsol coolant will be used in the system with an untreated life expectancy of approximately 100 days;

2. Coolant life will be doubled through use of the ALMCO system;

3. On-site treatment costs will average $0.10/gal of waste coolant; and

4. Coolant replacement costs for Trimsol will be $7.70/gal (undiluted).

Waste coolant generation will be further reduced by an estimated 33 percent from the rate projected after plant-wide switchover to Trimsol to 66,440 gal/yr.

Further significant reductions in waste coolant generation rates can be achieved through the use of similar coolant recovery technologies on a plant-wide basis. Two technologies which have been widely used and appear well-suited to AFP 6's needs are centrifugation and coalescing plate filtration. Several Air Force GOCO's currently utilize such systems:

- AFP 3 in Tusla, Oklahoma employs six portable coalescing plate filtration systems to service all of its machines.

- AFP 4 in Forth Worth, Texas employees a high-speed centrifugation system connected directly to machine sumps.

- AFP 44 in Tucson, Arizona has recently installed a high-speed centrifugation system which waste coolants are brought to for cleansing after removal from machines by portable vacuum trucks.

These systems have the advantage over cyclonic filtration systems of removing free-floating tramp oils, a major cause of bacterial growth. A centrifugal system, which used coolants are brought to for recovery with portable vacuum tanks, would allow recycling of all AFP 6 coolants, including coolants which must be removed from the ALMCO system due to excessive tramp oil formation. Alternately, portable coalescing plate filters are available which can be hooked directly to each machine for a period of time to remove swarth and tramp oils.

To extend the life of recovered coolant further, biocides may be added during the recycling step to retard the on-set of bacterial growth and rancidity. Alternately, flash pastuerization systems can be used to effectively kill bacterial growth without chemical addition. Vendor information for centrifugation, plate filtration and flash pasturization systems is provided in Appendix C.

The economics of each of the technologies described above has been estimated based on a processing capacity of 250,000 gal/yr, or 125 gal/hr. Preliminary cost estimates are presented in Appendix C together with vendor data. The economics of the three systems are summarized in Table 3-2.

3.1.2.3 Other Measures

Other measures which could potentially reduce coolant waste generation at AFP 6 include:

- Use of deionized water for makeup.
- Reduction of dragout losses through installation of a chip wringer.
- Purchase and use of a coolant analyzer.
- On-site incineration of tramp oils.

The use of deionized water in the coolant makeup process can extend useful life by preventing the reaction of water-borne ions (such as Ca^{+2} and Mg^{+2}) with coolant emulsifiers and detergents to form insoluble precipitates. The incorrect chemical balance which may result from using water with greater than approximately 3 grains/gal hardness cannot only reduce the coolant's life, it can cause the formation of gummy residues on machines and parts and cause corrosion of the machine and work tools.

TABLE 3-2
ECONOMIC SUMMARY FOR AFP 6 COOLANT RECOVERY SYSTEMS

OPTION	CAPITAL COST	ANNUAL OPERATING COST*	NET ANNUAL SAVINGS	PAYBACK
1. Mobile Plate Filtration	$10,000	$4,000	$3,700	2.7 years
2. Centrifugation	$65,000	$4,000	$3,700	17.5 years
3. Centrifugation with Flash Pasturization	$65,000	0	$7,700	8.4 years

*Operating costs reflect changes in labor and material purchases from current levels.

The use of an automated chip wringer or drainage system can help to reduce coolant dragout losses and would likely increase the resale value of the recovered aluminum chips. The economics of chip/coolant separation would probably not be favorable, however, unless utilized on a centralized coolant processing system similar to those described in Section 3.1.2.2. It is estimated that as much as 40 percent of the 83,050 gal/yr of coolant losses are attributable to chip dragout. If 80 percent of this dragout could be recovered and recycled for reuse in AFP 6 machining operations, a savings of approximately $10,000/yr in avoided coolant purchase costs could be realized. The data required to properly size a wringer system, estimate required facility modifications and project system costs are not currently available.

The use of a coolant analyzer can help facility staff to track coolant degradation, evaluate recovery systems, detect foreign object contamination and determine proper additive and makeup levels. Through systematic use in a coolant waste minimization program, a coolant analyzer can help achieve significant reductions in coolant waste rates. Although the resulting benefits are difficult to quantify, purchasers have estimated payback periods of only a few months for analyzers costing approximately $5,000.

Tramp oils collected from coolant recovery operations could potentially be incinerated on-site to reduce off-site disposal requirements. This opportunity is discussed further in Section 3.16.

3.1.3 Recommendations

It is recommended that Lockheed evaluate the feasibility and attractiveness of a centralized coolant recovery system capable of processing all AFP 6 waste coolants. System design criteria should be based on data gathered through evaluation of waste rates after the planned change to Trimsol is completed. The evaluation should include an analysis of the economics of a chip wringer or similar chip drainage system. It is also recommended that Lockheed acquire a coolant analyzer for evaluating coolant degradation rates. Finally, it is recommended that Lockheed evaluate the use of deionized water in coolant formulation.

3.2 ENGINE OIL AND HYDRAULIC FLUID WASTES

3.2.1 Waste Minimization and Management Methods

Approximately 25,000 gallons of used hydraulic oil and engine oil were generated at AFP 6 in 1984. Lockheed estimates that 90 percent of these oils are hydraulic fluids drained from mills, lathes, presses, shears and other machines. The remaining 10% are motor oils drained from vehicles during maintenance operations.

Used oils are collected in drums for resale to Arivec Chemicals, Inc. of Douglasville, Georgia, an off-site recycler. Lockheed currently receives $0.15/gal of recoverable oil or approximately $3,750/yr.

3.2.2 Waste Minimization Opportunities

Lockheed currently has measures in place to extend the life of hydraulic oils at AFP 6. Several mobile filtration units manufactured by H&H Industrial Products of Hartville, South Carolina are now used to periodically filter hydraulic oils in several of the larger AFP 6 machines. Lockheed estimates that the life of the oils in these machines is doubled as a result. Hydraulic oils throughout AFP 6 are drained and replaced on an annual basis.

It is estimated that the acquisition and routine use of portable oil purification systems would allow a 90 percent or greater reduction in waste oil generation rates. Several types of oil purification systems are commercially available which appear well suited to AFP 6's needs. All of these systems employ filtration as the primary solids removal technique, however, the type of filters used will vary between manufacturers. Although filtration systems such as the H&H equipment now in use at AFP 6 do provide some degree of water removal capability, a program designed to maximize oil life should employ specialized water removal equipment. Water removal systems typically operate by exposing a thin film of heated oil to a vacuum. Water as well as volatile hydrocarbons, acids and other contaminants are effectively removed in such systems.

By purifying oil on a routine basis with appropriate equipment, oil life can be extended to over 10 years. Periodic analysis to determine bottom sediment and water (BS&W) levels can be employed to verify equipment performance and schedule oil servicing operations. Existing Lockheed particle counters and laboratory facilities could be employed to conduct oil analyses at no additional capital cost.

The economics of a maximum oil recovery program appear quite favorable. Annual savings of $24,000 have been projected based on the following assumptions:

1. Hydraulic oil purchases can be reduced by 90 percent (based on reported system efficiencies).

2. Average new oil purchase costs are $2.00/gal (based on typical current prices).

3. All hydraulic oil will be purified once per month resulting in purification rates of approximately 270,000 gal/yr.

4. System O&M costs will average $0.05/gal, including testing (based on vendor estimates).

5. Current resale revenues of $3,040/yr will be lost (motor oils and unserviceable hydraulic oil will still be sold to a recycler).

Actual savings may be higher as time consuming draining, flushing and refilling operations can be discontinued. Based on the purchase of two $14,000 portable purification systems similar to the systems offered by Aquanetics of Farmingdale, New York, payback would occur in approximately 14 months. In addition, nonrecoverable hydraulic oils as well as used motor oils could potentially be incinerated on-site. This opportunity is described further in Section 3.16.

3.2.3 Recommendations

It is recommended that Lockheed acquire portable systems for the purification of all hydraulic oils. The systems should be equipped with vacuum purification capability to allow removal of water, acid and organic liquids. The systems acquired should be capable of automatically purifying oil in-situ, i.e., pumping the oil from a machine, through the purification system and directly back into the machine sump. It is recommended that all hydraulic oils be purified in this manner on a routine basis, preferrably once per month. BS&W levels should be investigated and an oil sampling and analysis program developed which will economically provide an appropriate level of quality assurance. Existing filtration systems should be dedicated to the largest (or most problematic) machines and operated at or near capacity. The machines connected to dedicated filtration systems should also be routinely serviced with the recommended purification systems to avoid buildup of water, acids, and organics.

It is recommended that used engine oils and nonrecycleable hydraulic fluids continue to be sold to off-site recyclers as this represents an economical, environmentally superior alternative to land disposal. As described in Section 3.16, on-site incineration of waste oils should also be evaluated as a future alternative to off-site recycling.

3.3 PAINT SLUDGE

3.3.1 Waste Description and Management Methods

Approximately 33,400 gal/yr of paint sludge are removed from the AFP 6 water curtain paint booths. Lockheed analyses indicate that these sludges have the following approximate composition:

- o 25-50% water
- o 25-30% dry solids
- o 7-10% oil
- o 5-10% polyvinyl acetate
- o 5-10% acrylic resin
- o 8-15% inorganic compounds

The sludges are skimmed from the booth sumps and accumulated in drums for landfill disposal by Chemical Waste Management in Emelle, Alabama. Disposal and transporation costs are approximately $185/drum or $112,760/yr.

3.3.2 Waste Minimization Opportunities

Paint booth sludge could potentially be dewatered to reduce the volume requiring disposal as a hazardous waste. However, conventional dewatering methods, which utilize pressure or vacuum filtration, would not perform adequately on the paint sludge currently produced at AFP 6, owing to the tacky nature of the sludge. The use of detackification chemicals could potentially allow the on-site dewatering of the sludge to achieve a significant reduction in paint sludge volumes.

These chemicals are typically fed on a continuous or semi-continuous basis to the water circulation system. Additional benefits achieveable through the use of spray booth chemicals include:

1. Detackified paint will be less likely to plug eliminator sections and nozzles, filter screens or stacks.

2. Maintenance cleaning costs may be reduced because the detackified paint is less likely to form deposits.

3. The booth remains cleaner and thus works more effectively to remove paint and odors from the air.

4. Corrosion is better controlled through moderation of pH, thus prolonging spray booth life.

The detackified paint sludge could potentially be pumped with the paint booth wastewater to the AFP 6 treatment plant for chrome reduction and dewatering. Alternately, the detackified sludge may be dewatered using a small vacuum filtration system connected to the sludge collection system. The latter option has the advantage of eliminating the need for transporting sludge to the IWT system.

The capital and operating costs associated with booth water chemical treatment and sludge dewatering are highly variable and must be determined through contact with system vendors. However, assuming that the sludge's water content can be lowered from its average of 38 percent to 20 percent, a 25 percent reduction in sludge waste volume is achievable. This would reduce off-site waste disposal by 8,300 gal/yr resulting in avoided disposal costs of approximately $28,000/yr.

Nalco Chemical Company of Oak Brook, Illinois has recently introduced a paint booth VOC control system which may also lower sludge generation. The primary purpose of the system, however, is to reduce solvent emissions. The water in the spray booth is replaced with an oil/water emulsion which has a high affinity for direct absorption of solvents present in the paint booth air. A separation unit is attached to the recirculation system to remove absorbed solvents and sludges. The recovered wastes may be treated through distillation using systems similar to those described in Section 3.4 to recover reusable solvents. Excess water and oils could potentially be distilled from the sludge for treatment in the AFP 6 IWO system. Engineering and cost data for the Nalco system are not currently available. Further evaluation of system feasibility and economics would require direct contact with the manufacturer.

As an alternative to on-site treatment, paint booth sludges could potentially be incinerated on-site. This opportunity is described further in Section 3.16.

3.3.3 Recommendations

It is recommended that Lockheed evaluate the feasibility of the spray booth programs described in this section. If it appears that system implementation could economically reduce waste generation or VOC emissions, Lockheed should conduct pilot testing using existing water curtain booths. In addition, the on-site incineration of paint booth sludge, as described in Section 3.16, should be evaluated.

3.4 PAINT & THINNER WASTE

3.4.1 Waste Description and Management Methods

Approximately 19,200 gal/yr of paint and thinner waste is generated at AFP 6, primarily from the cleanup of sprayguns and other equipment used in painting operations. In addition, significant amounts of chlorinated solvents generated during hand-applied cleaning of small parts (10 to 20 percent of the waste stream) are mixed with the paint and thinner waste at the accumulation points.

Each drum of paint and thinner waste is sent to Lockheed's Conservation Department to determine its suitability for sale to off-site recyclers. Based on the results of these analyses, which cost $200 each, nonrecoverable wastes are sent to Chemical Waste Management for landfill or incineration. Chemical Waste Management's disposal and transportation fees range from approximately $172/drum for chlorinated solvent wastes (1970 gal/yr) to $73/drum for solvent wastes with fuel value (12,100 gal/yr). Total disposal fees are approximately $22,230/yr.

Wastes determined to be recoverable are sold to Arivec for $0.15/gal. In 1984, Arivec purchased 5,115 gallons of paint cleanup solvents resulting in revenues of $770. The total of disposal costs and recycling revenues was $21,460 in 1984. Including on-site analysis costs of $200/drum, net waste management costs are estimated to be $91,300/yr.

3.4.2 Waste Minimization Opportunities

A significant portion of the solvents utilized in cleaning painting equipment and aircraft parts could potentially be reclaimed for reuse through distillation. To achieve economic recovery, however, it is essential that the waste solvents be segregated at the point of generation. This can be achieved by placing a sufficient number of clearly-marked

accumulation containers in generation areas and training employees in their proper use. Data compiled by Lockheed indicates that solvents amenable to recovery are accumulated at 36 sites within the plant and an additional 13 sites on the flight line. If successful, segregation of solvents at these accumulation sites would allow either sale of waste solvents to an off-site recycler (as discussed in Section 3.4.2.2) or on-site distillative recovery. In addition, nonrecyclable waste paints and thinners are excellent candidates for on-site incineration. This opportunity is described further in Section 3.16.

3.4.2.1 On-Site Solvent Recovery

In general, paints and thinners present in a concentrated paint stream are not amenable to economic on-site recovery for reuse owing to the difficulty of separating small amounts of solvent from large amounts of pigment. In addition, recycled solvents may not be economically recoverable for use as a paint thinner. This is due, in large measure, to the need to assure that recovered materials used as a surface coating constituent meet rigid military specifications (mil specs). However, solvents used to clean up paint spray guns and lines can typically be economically recovered on-site for reuse in equipment cleaning operations not impacted by mil specs.

Lockheed has requested funding for installation of an on-site solvent distillation system. The system acquired could be utilized for recovery of paint cleanup wastes as well as hand-applied solvents such as acetone, Stoddard solvent and naptha. Although a large capacity system could potentially be acquired and used to recycle more than one type of solvent, extra care would be required to prevent cross-contamination of solvents during distillation. The use of several smaller systems, each dedicated to recovery of a single solvent type, would minimize cross-contamination potential, but would be more costly to implement. A listing of distillation systems which may be appropriate to AFP 6's needs is presented in Table 3-3. Of the systems identified in Table 3-3, the Recyclene and Finish Engineering System are better suited to handling more than one solvent, as both utilize a disposable bag liner in the boiling sump. This liner can be replaced when changing solvents to further reduce cross-contamination potential.

TABLE 3-3
SOLVENT DISTILLATION SYSTEM SPECIFICATIONS

MANUFACTURER	UNIT	MAX. SOLVENT BOILING POINT	CAPACITY	COST
Finish Engr.	LS-55	320°F	55 gal/shift	$ 12,800
	2LS-55IV	500°F	110 gal/shift	-
Recyclene	R-70	400°F	70 gal/shift	$ 20,200
	R-110	400°F	110 gal/shift	-
Venus	SRS-5	320°F	56 gal/shift	$ 10,600
	SRS-20	320°F	100 gal/shift	$ 20,600
Brighton	7.5 GPH	350°F	60 gal/shift	$ 17,500
	25 GPH	350°F	200 gal/shift	$ 22,000
Crest Ultrasonics	CRS-10H	250°F	80 gal/shift	$ 4,160
Baron Blakeslee	HRS-20	250°F	160 gal/shift	$ 6,370
Detrex	FC-6EW	250°F	80 gal/shift	$ 5,840
	FC-6EW (insulated)	250°F	136 gal/shift	$ 6,600

Some solvents may have uses which require a high purity, such as paint thinning, as well as secondary uses which do not require high purities, such as spraygun cleanup. Two recovery options are available in these circumstances: (1) test recovered solvents to assure that appropriate mil specs are achieved, thus allowing their unrestricted reuse; or (2) presume that recovered solvents do not meet mil specs and restrict their reuse to cleanup or other noncritical operations. The first option requires testing of each batch of recovered solvents for purity indicators. With the second option, care must be taken to avoid the use of recovered solvents in critical operations. The use of clearly marked containers for restricted-use solvents can effectively minimize the potential for misuse of recovered solvents. In addition, cleaning stations similar to those shown in Figure 3-3 provide a convenient station for spray gun cleanup and cleaning solvent storage. These systems can reduce volatile losses as well as prevent inadvertent use of recovered solvents intended for use only in multiple equipment washings in operations requiring a high purity.

The economics of on-site distillative recovery have been calculated based on the following assumptions:

1. Methyl ethyl ketone (MEK) with a value of $2.48/gal (based on current Lockheed purchase costs) is recovered for restricted use in painting cleanup.

2. Painting wastes contain 50 percent recoverable MEK (based on Lockheed analytical data).

3. The recovery efficiency achieved for MEK is 90 percent (based on vendor reports).

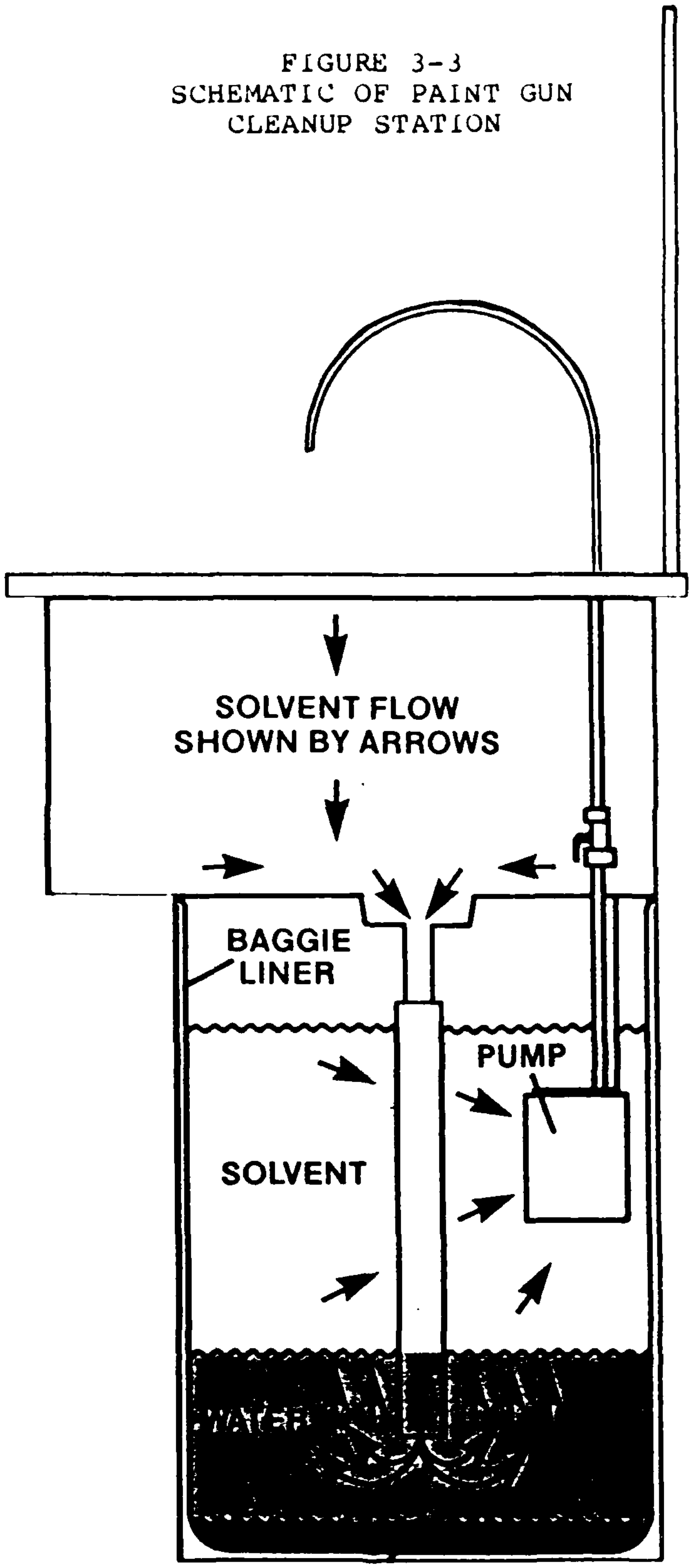
4. Current on-site waste analyses are reduced to two analyses/batch (based on 1,000-gallon batches).

5. Distillation system O&M costs average $0.20/gal processed (based on vendor reports).

On this basis, potential cost savings of $95,200/yr are projected for MEK recovery and reuse. Acquisition costs of $37,900 have been calculated for the following equipment:

1. An automated distillation system dedicated to MEK recovery at $20,000.

FIGURE 3-3
SCHEMATIC OF PAINT GUN
CLEANUP STATION



Drawing courtesy of
Build-All Corporation
Menomonee Falls, WI

2. Recovered solvent storage capacity of 1,000 gallons and associated hardware piping at $5,000.

3. Painting cleanup stations at each of the 16 locations where painting cleanup occurs at $10,400.

4. Upgraded solvent accumulation sites at $2,500.

Payback for this MEK recovery system is projected to occur within 4 months. Additional savings may be realized if other solvents can be reclaimed with the system for on-site reuse.

3.4.2.2 Off-Site Recycling

If segregated from other solvents and paints, a significant portion of the used painting solvents now rejected by the AFP 6 recycler could potentially be sold for recovery. The feasibility of off-site solvent recycling will depend on several factors, including the degree of contamination, the nature of contamination, the distance to the recycler's facility and the availability of local markets for resale of recycled solvents. Although it is technically feasible to recover solvents heavily contaminated with paints, many recyclers may not wish to attempt recovery of the AFP 6 paint wastes, as residual paints will tend to foul distillation towers, resulting in higher than normal maintenance costs.

To implement a successful off-site recovery program, it would be necessary for Lockheed to implement a segregation program similar to that described for on-site recycling of solvents. The segregated waste solvents could be accumulated in drums, for sale on the off-site recycler. The implementation costs for such a program are estimated to be $2,500 for the improvement of existing waste accumulation points to allow segregation.

Assuming that 50 percent of the wastes now rejected for recycling would be acceptable if properly segregated, cost savings of $12,280/yr could be realized based on the following assumptions:

1. Avoided disposal costs of $11,230/yr (50 percent of current disposal costs).

2. Increased resale revenues of $1,050/yr.

Payback of accumulation site improvement costs is projected to occur in less than three months.

3.4.3 Recommendations

It is recommended that Lockheed improve segregation operations at AFP 6 to allow for on-site distillative recovery of MEK for reuse in painting cleanup operations. To achieve thorough waste segregation it is recommended that Lockheed:

1. Provide clearly-marked containers at accumulation points for every recoverable solvents which may be utilized in the area being serviced as well as other wastes.

2. Provide paint gun cleanup stations similar to Figure 3-3 in each paint booth.

3. Educate workers as to the importance of waste segregation.

4. Delegate responsibility for waste segregation practices to line management.

5. Conduct routine checks to identify accumulation points where proper segregation is not being practiced.

6. Where nonsegregation is detected, employ management initiatives to correct problems.

It is recommended than a distillation system with a recovery capacity of approximately 55 gal/shift be acquired for dedicated MEK recycling. A tank for storage of recovered MEK should also be provided to allow quality control analyses to be conducted on large batches (approximately 1,000 gallons), thereby minimizing analytical costs. Concentrated paint residues and other distillation residues should be scheduled for off-site disposal through incineration to minimize long-term liability exposure. It is recommended that Lockheed investigate the feasibility of recovering other solvents in the waste paints and thinners stream using the acquired system. These investigations should include evaluations of any necessary laboratory testing for recertification.

It should be noted that off-site disposal costs would be significantly reduced by eliminating chlorinated materials from the paints and thinners waste stream, as unit costs for disposal of nonchlorinated organics are almost $100/drum less than those for chlorinated organics. These savings have not been included in the preceeding projections. In addition, the use of the recommended painting cleanup stations would help to reduce volatile losses which currently represent a significant regulatory concern at AFP 6.

As described in Section 3.16, it is recommended that Lockheed evaluate the on-site incineration of nonrecoverable portions of the paint and thinner waste.

3.5 TRICHLOROETHYLENE WASTE

3.5.1 Waste Description and Management Methods

Trichloroethylene (TCE) is used in 13 vapor degreasers at AFP 6 to clean parts. Approximately four times per year, as the performance of the degreasing solution drops, the sumps are boiled down to remove uncontaminated TCE and the sump contents are transferred to 55-gallon drums for disposal. Approximately 4,400 gal/yr of waste TCE are generated in this manner.

The TCE waste is sent to the Conservation Department for evaluation as a recycling candidate. A sample is drawn from each drum and analyzed by Lockheed's chemistry laboratory for organic chemical composition. Approximately 57 percent of the TCE is currently accepted by Arivec for recovery. The remaining 43 percent is disposed at Chemical Waste Management in Emelle, Alabama.

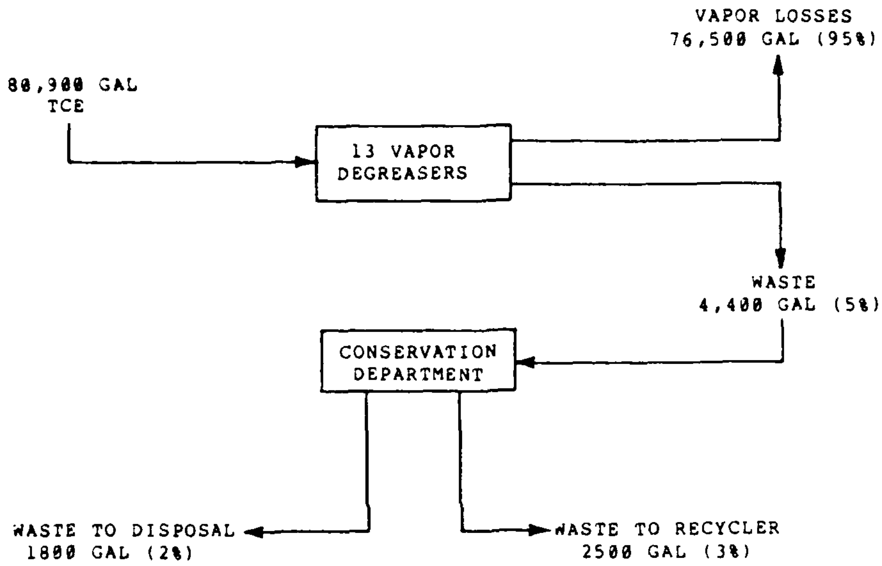
Approximately 80,900 gal/yr of TCE are purchased by Lockheed for use at AFP 6. Of this, an estimated 95 percent is lost to the atmosphere. Figure 3-4 presents an annual mass balance for TCE use at AFP 6 based on 1984 and first half 1985 data. As shown, net disposal and recycle costs are approximately $5,520/yr.

3.5.2 Waste Minimization Opportunities

Several potential opportunities for TCE waste minimization exist at AFP 6. These include:

1. Cover repair
2. Increased cover use
3. Improved degreasing practices
4. On-site recycling
5. Consolidation of degreasing activities

FIGURE 3-4
ANNUAL TRICHLOROETHYLENE (TCE) MASS BALANCE



SYSTEM COSTS

TCE Purchases:	924 gal (drums) @ $4.68/gal	=	$ 4,324
	80,000 gal (bulk) @ $3.89/gal	=	311,200
Waste Analyses:	80 drums @ $200/each	=	16,000
Recycle Revenue:	2,500 gal @ $0.15/gal	=	- 375
Disposal Fees:	1,800 gal @ $3.28/gal	=	5,895
TOTAL ANNUAL COSTS			$ 337,044

Each of these opportunities is discussed in this section. it should be noted that Lockheed, as a potential air emission compliance measure, has been evaluating the use of 1,1,1-trichloroethane (TCA) as a replacement for TCE in the AFP 6 degreasers. Even though a changeover to TCA may eventually be implemented, the opportunities described in the following subsections would still be applicable.

3.5.2.1 Cover Repair

All AFP 6 vapor degreasers are equipped with covers. Some of the covers, however, show signs of wear such as cracks and seam gaps. Further, the cover of the large M-52 degreaser is broken, necessitating the use of a poorly-fitting, heavy steel cover which must be raised and lowered with a crane. Repair or replacement of damaged and poorly fitting covers could potentially achieve a significant reduction in emission losses.

Properly fitting degreaser covers can reduce volatile losses by 20 to 40 percent compared to uncovered units. Assuming that losses attributable to poorly-fitting or damaged covers average 4 percent of total losses, cover repairs could reduce TCE losses by 3200 gal/yr, resulting in avoided TCE purchase costs of approximately $12,500/yr. As the precise nature and extent of needed cover repairs are not known, repair costs cannot be accurately estimated.

3.5.2.2 Increased Cover Use

During the plant visit some degreasers were noted to have been left uncovered when not in use. Assuming that covers are left open unnecessarily 2 hrs/day and that a closed cover is 30 percent effective at reducing losses, it is estimated that 2,700 gal/yr of TCE losses could be avoided through judicious use of covers. Cost savings resulting from increased cover use are projected to be $10,500/yr.

3.5.2.3 Improved Degreasing Practices

Certain degreaser operating practices can result in unnnecessary TCE vapor losses. These include:

- Improper entry and exist speed control;
- Excessive loading; and
- Use of spray systems outside of the vapor zone.

The actual extent to which improper degreasing practices contribute to volatile losses could not be asssessed during the plant visit. However, experience with similar operations and review of published literature indicate that improved operating practices could reduce losses by 5 percent or more, resulting in reduced losses of 4,000 gal/yr and savings of $15,800/yr.

Improper speed control during part entry will force vapors past the cooling coils at a faster rate than they can be condensed, resulting in excessive vapor losses. Similarly, too high an exit speed can drag out vapors. The ASTM "Handbook of Vapor Degreasing" recommends a maximum entry/exit speed of 11 feet/minute. Most industrial cranes operate at approximately twice this speed or greater. As speed controllers are expensive crane add-ons (approximately $25,000 each) proper regulation of part velocity is often achieved by "stepping" the parts into the degreaser with a paced stop-start action timed to achieve an average velocity less than 11 feet/minute.

Excessive loading of the degreaser can also force vapors past the cooling coils at too great a rate. ASTM recommends that workloads not exceed 50 percent of the vapor zone working volume.

Solvent spray systems (liquid spraying wands) should never be operated outside of the vapor zone, as vapor losses are greatly increased by such operations. Degreaser operators at AFP 6 reportedly use spray wands outside of the degreasers on occasion, allowing the sprayed TCE to drain to the plant wastewater treatment system.

3.5.2.4 On-Site Recycling

Lockheed has requested Air Force funding for the installation of a distillative solvent recovery system at AFP 6. The bulk of the TCE wastes generated at AFP 6 appear to be excellent candidates for on-site recovery through distillation technology. Conservation Department records indicate that TCE concentrations in solvents currently sold to Arivec typically exceed 99 percent and those sent off-site for disposal have an approximate TCE concentration of 80 percent.

Current TCE waste generation rates average approximately 17 gal/day. A limited number of distillation systems are

available with capacities in this range. The systems listed in Table 3-4 appear appropriate for AFP 6 TCE recovery needs. If a small storage tank is provided for accumulation of recycled TCE, further savings can be realized through reduced chemical analysis needs.

The economics of on-site TCE recovery appear quite favorable. Net annual sa.ings of $30,000 are projected based on the following assumptions:

1. Average TCE concentrations in degreaser wastes will be 90 percent (based on Lockheed operating records).

2. Distillation recovery efficiency will be 95 percent (based on vendor data).

3. Current average TCE purchase costs of $3.90/gal will remain constant.

4. Lost revenue from current waste TCE sales of $370/yr will be realized.

5. TCE will be recovered in 500-gallon batches with chemical analysis costs averaging $400/batch (based on current Lockheed analysis costs of $200/sample);

6. Distillation residues will require off-site disposal at a cost of $3.12/gal (based on current disposal fees).

7. System O&M costs will average $0.20/gal processed (based on vendor estimates).

Assuming a distillation system is procured for $15,000 ($13,000 distilaltion unit, $2,000 for storage tankage and installation), payback could be realized in approximately 6 months. A potential waste stream reduction of 85 percent is projected.

Based on Lockheed analyses of waste TCE sent to Chemical Waste Management for disposal, it appears that waste TCE is often mixed iwth 1,1,1-trichloroethane (TCA) at the point of generation. As both solvents have similar boiling point ranges, distillative recovery of TCE would require segregation from TCA at the point of generation. The accumulation site improvements and worker training measures described in Section 3.4 should allow adequate segregation of these solvents.

TABLE 3-4
SOLVENT DISTILLATION SYSTEM SPECIFICATIONS

MANUFACTURER	UNIT	MAX. SOLVENT BOILING POINT	CAPACITY	COST
Finish Engineering	LS-15	320°F	15 gal/shift	$ 5,030
	LS-55	320°F	55 gal/shift	$12,800
Recyclene	R-35	400°F	35 gal/shift	$11,900
Venus	SRS-5	320°F	56 gal/shift	$10,600

3.5.2.5 Consolidated Degreaser Operations

Lockheed is currently evaluating the feasibility of consolidating vapor degreasing operations at AFP 6. This would involve removing certain degreasers from service and transferring the operations conducted in those degreasers to other units. Although waste generation rates would be relatively unaffected, solvent vapor losses could be significatnly curtailed. The impact of this change cannot be quantified until Lockheed completes its assessment.

3.5.3 Recommendations

It is recommended that Lockheed implement appropriate measures to reduce TCE vapor losses. These measures consist of the following:

1. Evaluate the condition of degreaser covers and repair damaged and poorly fitting covers.

2. Train employees in the importance of judicious cover use.

3. Post signs at each degreaser mandating strict use of covers.

4. Delegate responsibility for cover use to line management.

5. Conduct periodic spot checks to verify routine cover use.

6. Evaluate crane entry/exit speeds and train operators in proper speed control methods.

7. Train employees in proper loading rates.

8. Train employees in proper spray system use.

9. Evaluate potential consolidation of degreasing activities.

In addition, it is recommended that Lockheed begin segregating waste TCE from other solvents and institute an on-site TCE recovery, testing and reuse program. To acheive proper segregation, it is recommended that Lockheed:

1. Provide clearly-marked containers at accumulation points for every recoverable solvent which may be utilized in the area being serviced as well as other wastes.

2. Educate workers as to the importance of waste segregation.

3. Delegate responsibility for waste segregation practices to line management.

4. Conduct routine checks to identify accumulation points where proper segregation is not being practiced.

5. Where nonsegregation is detected, employ management initiatives to correct problems.

A small distillation system should be acquired with a storage system for recovered solvents. Composite samples of waste TCE should be tested to verify that each batch to be recycled dos not contain azeotropic contaminants. Each batch of recycled TCE should be tested prior to reuse to verify its purity.

3.6. 1,1,1-TRICHLOROETHANE WASTE

3.6.1 Waste Description and Management Practices

Lockheed utilizes 1,1,1-trichloroethane (TCA) in a variety of hand-applied cleaning operations at AFP 6. Purchase records indicate that 10,100 gallons of TCA were consumed at AFP 6 in 1984, of which 5,265 gallons (52 percent) were sold to Arivec for recycling. It is estimated that an additional 200 gallons (2 percent) were mixed with painting wastes (see Section 3.4) at the accumulation sites and disposed through incineration by Chemical Waste Management. The remaining 4,635 gallons (46 percent) were presumably lost to the atmosphere during use or absorbed onto rags which were washed on-site and reused.

Lockheed receives $0.15/gal of TCA accepted by Arivec or approximately $790/yr. Disposal costs for the 200 gal/yr sent to Chemical Waste Management are $172/drum or $690/yr. However, much of the TCA sent to Chemical Waste Management was mixed with other waste materials which normally would have been disposed at $99/drum less than the fees charged for

chlorinated wastes. As a result, it is estimated that 1770 gallons of painting wastes which could have been recycled or, at a minimum, disposed at $73/drum were disposed at a cost of $172/drum. The extra disposal costs attributable to incomplete segregation are estimated to be $3200/yr.

3.6 Waste Minimization Opportunities

3.6.1 On-Site Recycling

TCA is readily amenable to on-site distillative recovery for reuse. However, to recover a product which can meet mil specs, it is essential that other solvents, particularly TCE and MEK, which can form an inseparable azeotrope with TCA, be segregated from the TCA at the point of generation. The measures described in Section 3.4 should be sufficient to allow proper segregation and on-site recovery of TCA.

To allow reuse of recovered TCA in precision cleaning operartions it would be necessary to analyze the recovered material and certify its purity. In addition, acid acceptors and white metal stabilizers present in the TCA may be depleted and require replenishment after continued reuse. Existing Lockheed laboratory capabilities, now used to test waste solvents scheduled for sale to Arivec, could be utilized to provide the necessary quality testing. Solvent additive level test kits, available from distillation system vendors such as Detrex and Baron Blackslee, could be utilized to determine the quantity of additives needed to replenish each batch of recovered TCA. Replacement additives may also be obtained from these companies as well as PPG Industries, a major solvent manufacturer.

Utilizing one of the distillation systems listed in Table 3-3 (Section 304), TCA could be recovered directly from drums. By providing a storage tank for recovered TCA, solvent analysis costs could be minimized.

The economics of on-site TCA recovery are quite favorable. Cost savings of $15,300/yr are estimated based on the following assumptions:

1. Approximately 90 percent of the TCA waste or 4,740 gal/yr is recovered for reuse.

2. Avoided new solvent purchase costs will be $4.52/gal (the current price paid by Lockheed) or $21,400/yr.

3. Lost recycling revenues will be $0.15/gal processed or $790/yr;

4. Solvent will be recovered in 500-gallon batches with two quality control analyses for each batch at $250/analysis or $2,370/yr (based on current analysis costs and vendor estimates).

5. Distillation residues will be disposed off-site at a cost of $173/drum or $1,650/yr (based on current Chem Waste fees).

6. System O&M costs, including additive replenishment will be $0.25/gal processed or $1,320/yr (based on vendor estimates).

Based on acquisition costs of $15,000 for a distillation system and $2,000 for installation of a 500-gallon stainless-steel holding tank and plumbing, payback would occur in approximately one year.

3.6.2.2 Increased Off-Site Recycling

Through the improved segregation measures described in this Section and in Section 3.4, an additional 200 gal/yr of TCA now disposed by Chemical Waste Management at approximately $172/drum could be recovered from the paint and thinner waste stream for resale to an off-site recycler, resulting in savings of $630/yr. In addition, as described in Section 3.4, this would reduce the disposal costs of approximately 1,770 gal/yr of waste paints and thinners by $99/drum or $3200/yr. Resale revenues would be increased by approximately $30/yr. Total projected savings through increased off-site recycling are estimated to be $3,860/yr.

3.6.3 Recommendations

It is recommended that Lockheed implement an on-site TCA recycling program as described in Section 3.6.2.1. The waste segregation measures described in Section 3.4.3 should be implemented to minimize foreign substance contamination of TCA. A solvent distillation system and recovered solvent storage tank dedicated to TCA recovery should be acquired. A testing program should be employed to screen solvents as they are generated, determine additive replacement requirements of

recovered solvents and certify the recovered solvents for unrestricted reuse. As recommended in Sections 3.4 and 3.5, one employee should be assigned full-time responsibility for the management and operation of AFP 6 solvent segregation and recovery programs.

3.7 FUEL WASTE

3.7.1 Waste Description and Management Practices

In 1984, 79,730 gallons of JP-4 and JP-5 aircraft fuel were discarded due to contamination during aircraft fueling and defueling operations. An additional 90 gallons of waste kerosene were also generated from undetermined sources. These wastes are currently accumulated in drums for sale to Arivec where they are used as supplemental boiler fuels. Based on the current sales price of $0.45/gal, revenues of $35,920/yr are realized.

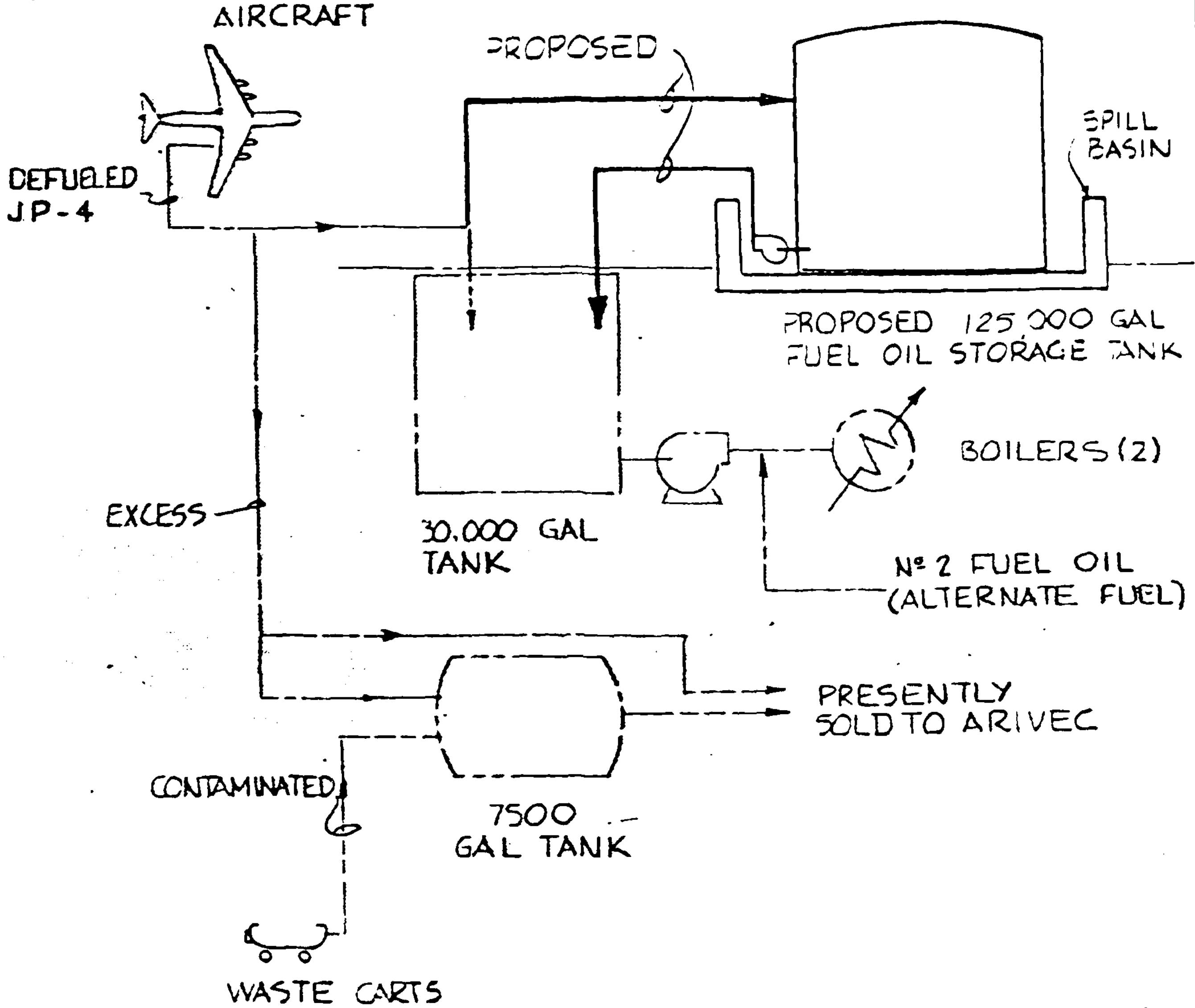
3.7.2 Waste Minimization Opportunities

In a 1984 report prepared for Lockheed, Chester Engineers identified the reuse of waste fuels in the existing flight line boilers as a viable alternative to sale of the materials. By providing sufficient additional on-site storage capability to allow use of the aircraft fuels in lieu of purchased fuel oil, Chester estimated that $57,700/yr in net savings could be realized. Total system acquisition costs were estimated to be $226,200, resulting in a payback period of approximately 4 years. Figure 3-5 shows the proposed facility. It should be noted, however, that Chester's study was based on the 1983 waste generation rate, of 140,700 gallons. Actual waste fuel generation rates in 1984 were 43 percent lower than in 1984. If the facility design is adjusted for the lower 1984 generation rate, an acquisition cost of $140,000 is estimated (based on Chester's estimated design and engineering costs). Adjusted annual savings of $35,100 are projected based on:

- Lost revenues of $0.45/gal or $35,900/yr
- Avoided fuel oil purchase costs of $0.89/gal or $71,000/yr.

The payback period calculated by Chester remains unchanged at approximately 4 years.

FIGURE 3-5. WASTE FUEL REUSE SYSTEM



PROPOSED AVIATION FUEL STORAGE FACILITY

The Chester Engineers			SHEET NO.	LOCKHEED-GEORGIA AIR FORCE PLANT 6
DWN.BY: DON	SCALE: NONE	DATE	DWG. NO.	
CHK'D.BY: DMF	APPR.BY: SKG	MARCH 84	VI-2	

As an alternative to use as a boiler fuel, fuel waste would serve as an excellent fuel for operation of an on-site incinerator. This opportunity is described further in Section 3.16.

3.7.3 Recommendations

It is recommended that Lockheed evaluate the economics and regulatory implications of on-site reuse of all aircraft fuel waste in the flight line boilers. Preliminary cost estimates should be prepared based on local contractor quotes to better estimate implementation costs, as standard building construction cost data references indicate that actual construction costs may be significantly less than those presented in Section 3.7.2. In addition, as described in Section 3.16, it is recommended that Lockheed evaluate the use of waste fuels as a heat source for on-site hazardous waste incineration of other AFP 6 wastes.

3.8 SPENT SALT BATHS

Approximately 3,250 gallons of spent salt baths are generated at AFP 6 each year. These baths contain three different materials:

1. Kolene, which consists of sodium hydroxide, sodium nitrate and sodium chloride from paint stripping operations;

2. Tempering C containing sodium and potassium nitrates from aluminum heat treating; and

3. Draw Temp 430, which is similar in composition and use to Tempering C.

These wastes are currently stored in drums for landfill disposal by GSX in Pinewood, South Carolina at a cost of approximately $61/drum or $3600/yr.

No alternatives for minimizing waste generation or off-site landfill requirements have been identified.

3.9 CHEM MILL WASTE

3.9.1 Waste Description and Management Practices

Lockheed utilizes a chemical milling process to remove aluminum from C-5B parts in Building B-91. Chem milling is conducted with a heated solution of sodium hydroxide and

sodium bisulfate. The system consists of several milling tanks, a piping network and recycle pumps, surge and storage tanks, heat exchangers and a clarifier. The nominal volume of the system is 350,000 gallons.

When the free aluminum content of the etching solution exceeds the maximum allowable concentration, the system must be decanted and fresh etchant added. Data from the first six months of 1985 indicate that 370,000 gal/yr of waste etchant are generated at AFP 6. Based on current production schedules, Lockheed estimates that C-5B production will continue until 1989.

Chem mill waste is drained from the process lines to the industrial waste treatment system clarifier for temporary storage. From the clarifer it is pumped to 17,500-gallon rail cars for bulk transport to DuPont in Chambersworks, New Jersey. The chem mill waste is treated by DuPont in their wastewater treatment system at a cost of $0.05918/lb (including transportation and demurrage) or approximately $232,000/yr.

3.9.2 Waste Minimization Opportunities

Wilson & Company has completed a study of potential chem mill waste minimization measures on behalf of Lockheed. Their June, 1985 report identifies two technologies for chem mill solution recovery and reuse:

1. Lime precipitation of free aluminum to form a calcium aluminate sludge.

2. Crystallization of free aluminum at reduced temperature to form aluminum trihydrate crystals.

Both systems would almost eliminate the generation of hazardous wastes while recovering etchant solution for continued reuse. The crystallization system, however, does not appear suitable for use at AFP 6 as it requires a higher influent free aluminum concentration than is acceptable (6.0 oz/gal versus Lockheed's upper limit of 4.0 oz/gal).

Wilson predicts that lime precipitation could be employed to produce an acceptable etchant for reuse while producing a high volume of nonhazardous sludge which could be disposed at a sanitary landfill.

Figure 3-6 presents a process flowsheet for the lime precipitation system. As shown, the major system components are:

1. Smut Centrifuge to remove hazardous contaminants prior to processing

2. Lime Flash Tank to mix calcium hydroxide with the etchant

3. Recovery Clarifer to remove calcium aluminate from the etchang

4. Heat Exchanger to reheat the etchant solution for return to the process tanks

5. Horizontal Belt Vacuum Filter to dewater the calcium aluminate sludge

6. Reslurry and pH Adjustment Tanks to neutralize excess lime in the calcium aluminate sludge

7. Rotary Belt Vacuum Filters to dewater the calcium aluminate prior to off-site disposal.

Figure 3-7 presents a process flowsheet for the crystallization process including equipment to produce a saleable crystal product. The principal features of the system are:

1. Smut Centrifuge to remove hazardous useful sulfides

2. Surge Tanks to regulate process flows

3. Two Crystalizers with integral cooling to promote crystallization of aluminum trihydrate

4. Alumina Centrifuge to separate etchant from the crystals

5. Crystal Drier to increase crystal concentrations to a saleable level.

Table 3-5 presents a comparison of the economics of lime precipitation and crystllization versus current solution replacement procedures. Two lime precipitation options were developed by Wilson for possible implementation; one which utilizes existing rotary drum belt vacuum filters and a second which employs new, more efficient filters. In addition, two technologies for crystallization were costed: the genertion of nonhazardous crystal wastes requiring disposal and the use of a crystal drier to produce saleable aluminum trihydrate crystals.

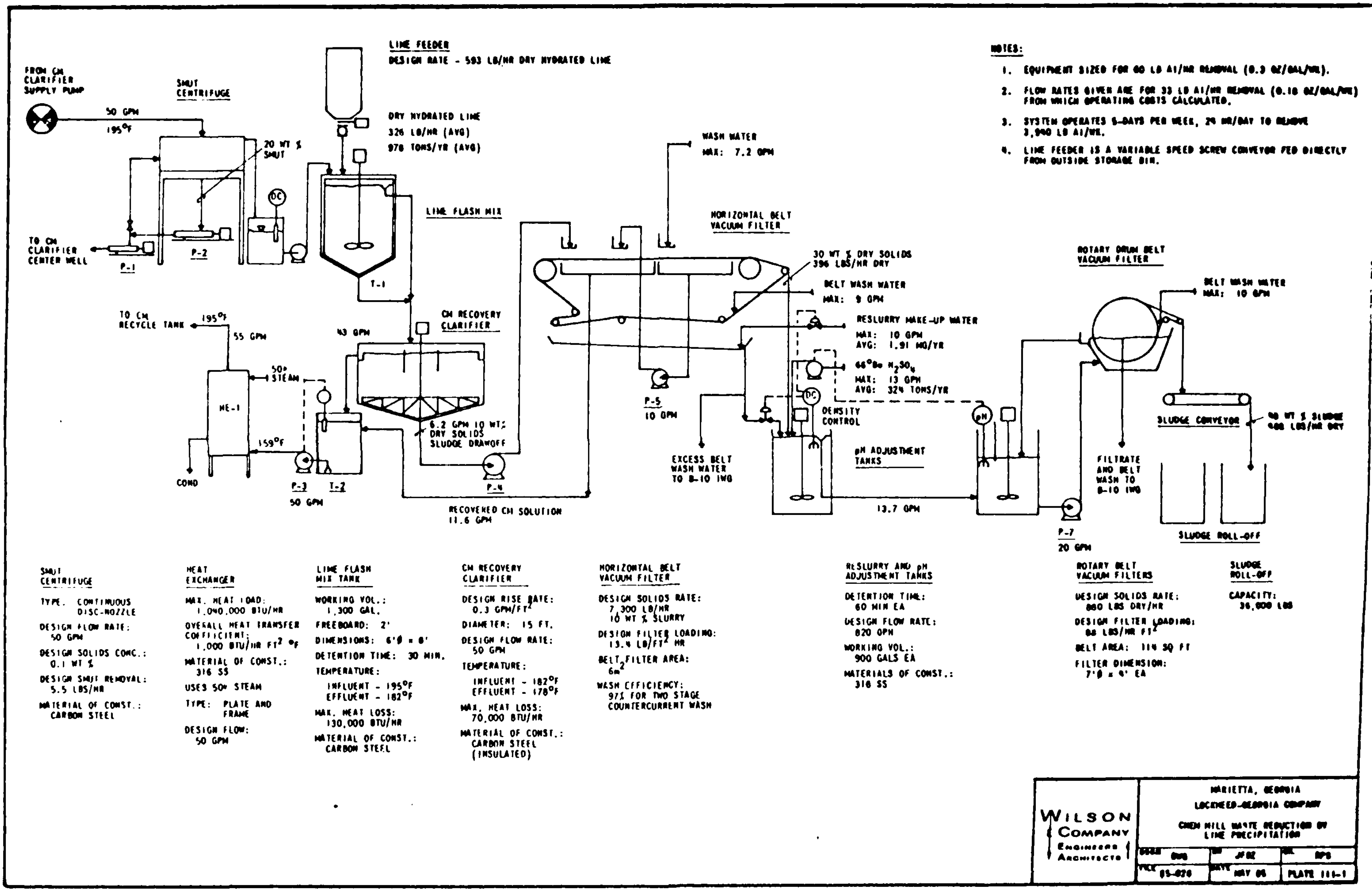


FIGURE 3-6. LIME PRECIPITATION SYSTEM FOR RECOVERY OF CHEM MILL WASTES

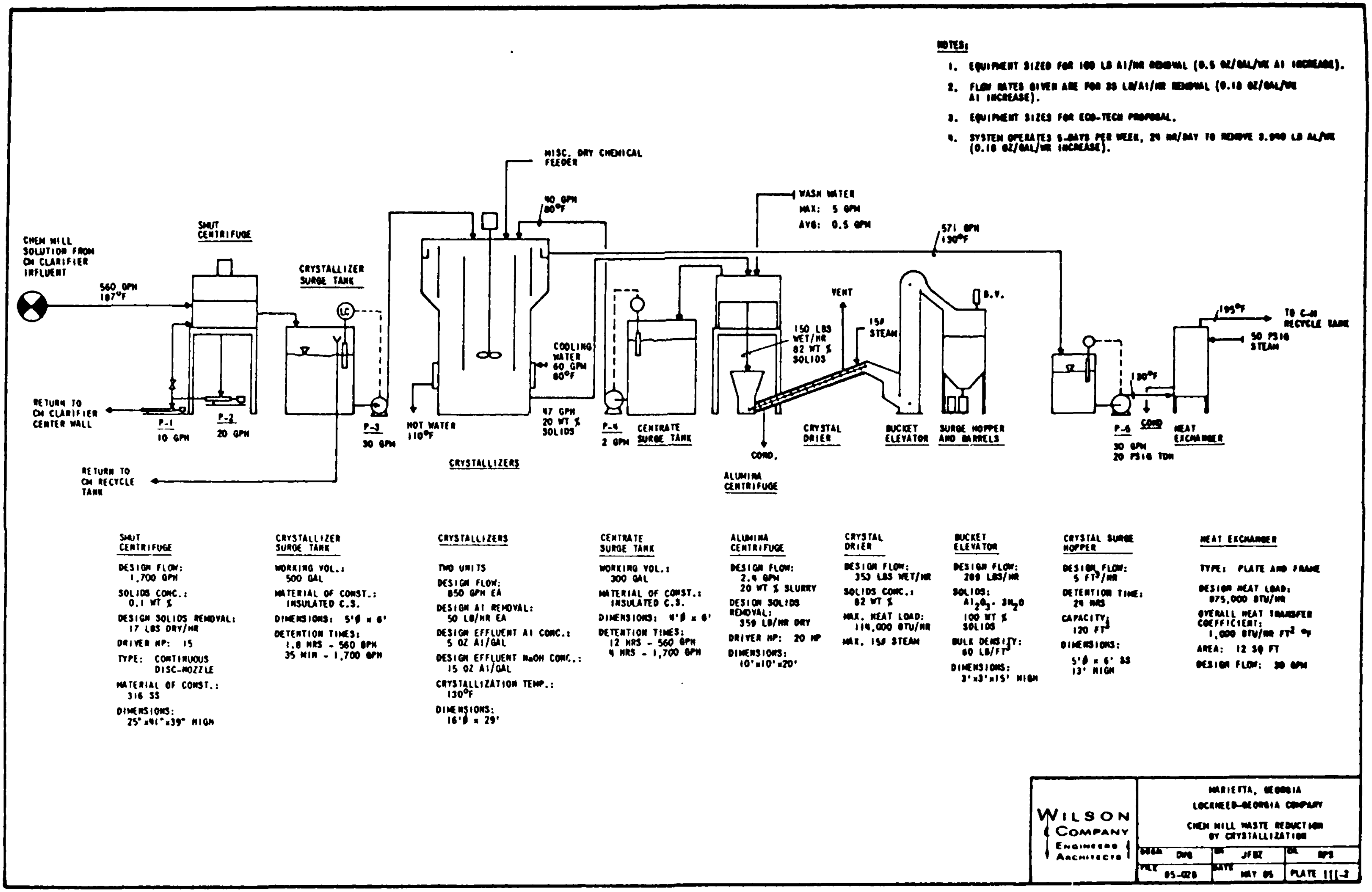


FIGURE 3-7. CRYSTALLIZATION SYSTEM FOR RECOVERY OF CHEM MILL WASTES

TABLE 3-5
COST COMPARISON FOR CHEMICAL MILLING SOLUTION TREATMENT ALTERNATIVES

ALTERNATIVE	ENGINEERING AND CONSTRUCTION COSTS	OPERATING COSTS	ANNUAL SAVINGS	PAYBACK
1. Existing System	--	$514,000/yr	--	--
2. Lime Precipitation (Existing Filters)	$969,000	$322,000/yr	$192,000/yr	5.0 years
3. Lime Precipitation (New Filters)	$1,257,000	$231,000/yr	$283,000/yr	4.4 years
4. Crystallization (Crystal Disposal)	$875,000	$66,000/yr	$448,000/yr	2.0 years
5. Crystallization (Crystal Sale)	$979,000	$24,600/yr	$490,000/yr	2.0 years

Source: Wilson & Company, Chemical Waste Treatment for Industrial Waste Treatment Plant B-10 Building, June 1985.

As shown, payback periods range from 2.0 years for both crystallization systems to 5.0 years for a lime precipitation system using existing filters. Because currently contracted C-5 work only runs through 1989, payback could not be realzied for a lime precipitation system under current workloads. Although payback could be achieved on a crystallization system under existing C-5 contracts, it is not compatible with current chem mill operations.

3.9.3 Recommendations

It is recommended that Lockheed reevaluate chem milling requirements and determine if existing operations could be conducted using solutions with free aluminum concentrations which are high enough to permit recovery by crystallization (5.4 to 6.0 oz/gal). If the reduced milling rates which would result by operating at increased free aluminum concentrations are acceptable, it appears that a crystallization system may be implementable in time to achieve investment payback and should be pursued.

If increased free aluminum concentrations in the etchant solution are not acceptable, a lime precipitation system should be considered. It is recommended that the Air Force determine the potential for utilizing existing chem mill operations beyond 1989. If long-range planning indicates that this weight reduction technology is likely to be used through 1991, it appears that lime precipitation could be implemented in time to achieve payback and should be pursued.

3.10 CHEM MILL MASKANT WASTE

Approximately 660 gallons of chem mill maskant, a mixture of toluene, xylene isomers and ABS rubber, were disposed by Lockheed in the first six months of 1985. The reason for disposing of the maskant has not been determined, however, Lockheed does not anticipate disposing of waste maskant again. No opportunities for minimization have been considered.

3.11 CYANIDE WASTE

Lockheed generated approximately 115 gallons of solid, cyanide-contaminated residues in the first six months of 1985 from the cleanout of a cadmium plating tank. The waste, which was landfilled by Chemical Waste Management will not be generated again, hence, no minimization opportunities have been explored.

Although cadmium is still plated at AFP 6, Lockheed has eliminated the use of cyanide by switching from an alkaline cyanide cadmium bath to an acid cadmium bath. The plating bath, called "Cadize Plating Solution", is manufactured by Learonel, Inc. It has been in use for over two years at AFP 6, providing product quality equivalent to that achieved with cyanide-cadmium plating. Although the Cadize, at approximately $3.00/gal, is more expensive than cyanide-cadmium baths, Lockheed reports that the resulting reduced waste treatment costs have resulted in net cost savings.

3.12 IWT SLUDGE

3.12.1 Waste Description and Management Practices

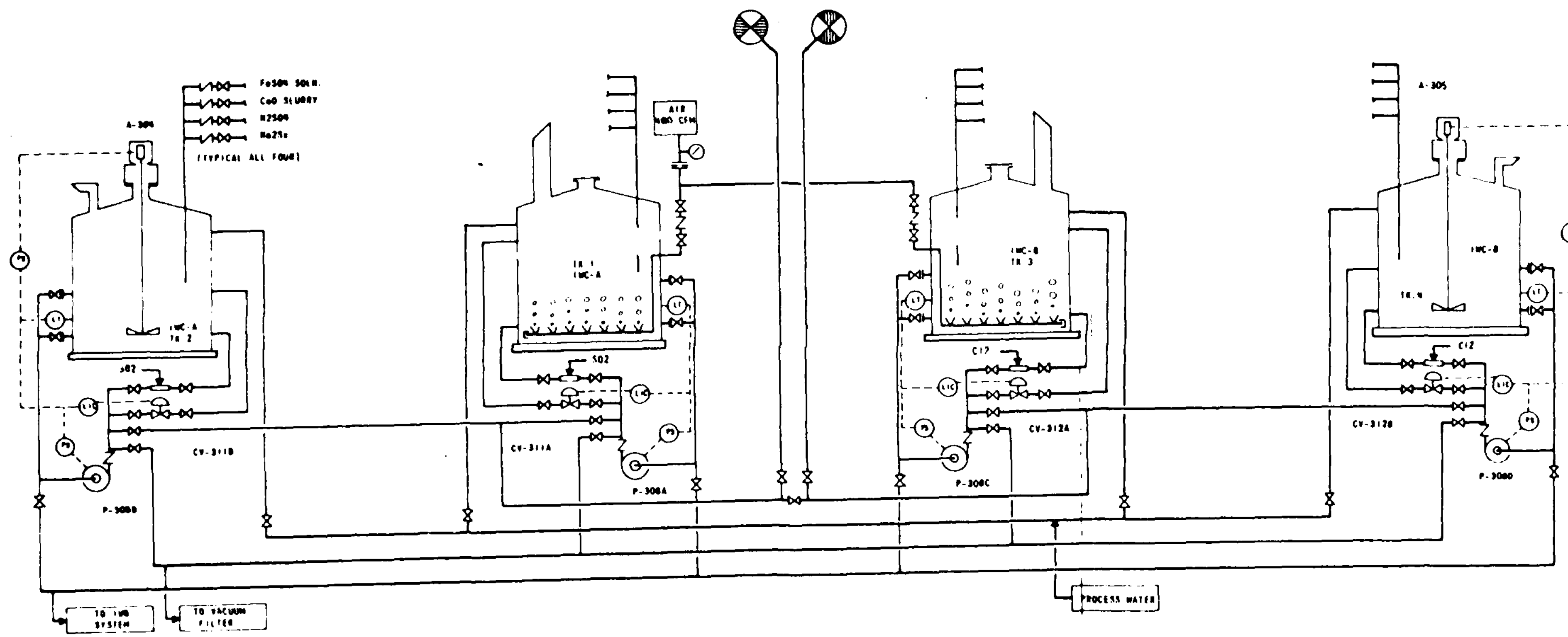
Approximately 192,000 gal/yr of sludge are produced during the operation of the AFP 6 industrial waste treatment (IWT) plant. The most recent data available (1983) indicate the following sludge composition:

Solids	24-32%
Fe_2O_3	4-12%
Oils	8-16%
SiO_2	4-12%
CN (total)	0.02-0.04%
Cd	350-550 ppm
Cr	3000-4500 ppm
Zn	20-60 ppm

As described in Section 3.11, cyanide is no longer used at AFP 6. Cyanide levels are expected to fall to zero as all cyanide residues are removed from the plant.

The IWT system consists of three independent systems: the oily industrial waste (IWO) system shown in Figure 3-2 (page 3-7), the concentrated industrial waste (IWC) system shown in Figure 3-8; and the general industrial waste (IWG) system shown in Figure 3-9. Effluent from the IWG is further "polished" using powdered activated carbon prior to direct discharge to a local stream. Sludge from all three systems is thickened and dewatered in the system shown in Figure 3-10. Flow data for the IWT systems are presented in Table 3-6.

The IWT sludge was previously disposed on-site in a clay-lined surface impoundment at a low unit cost. The disposal impoundment has recently reached its capacity and



CHEMICAL TREATMENT SECTION

FIGURE 3-8. AFP 6 CHEMICAL INDUSTRIAL WASTE TREATMENT SYSTEM

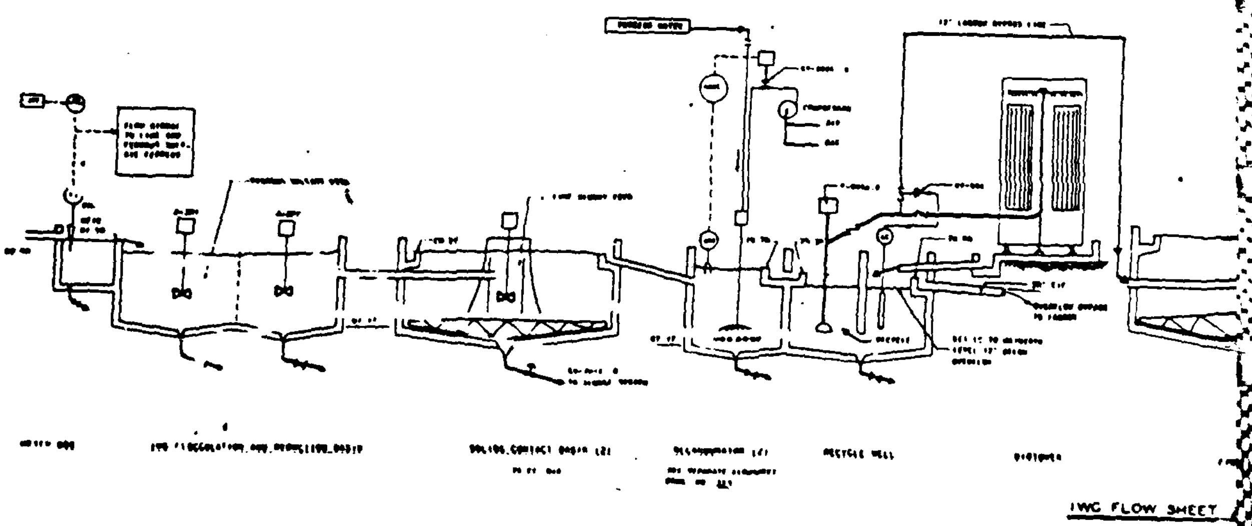
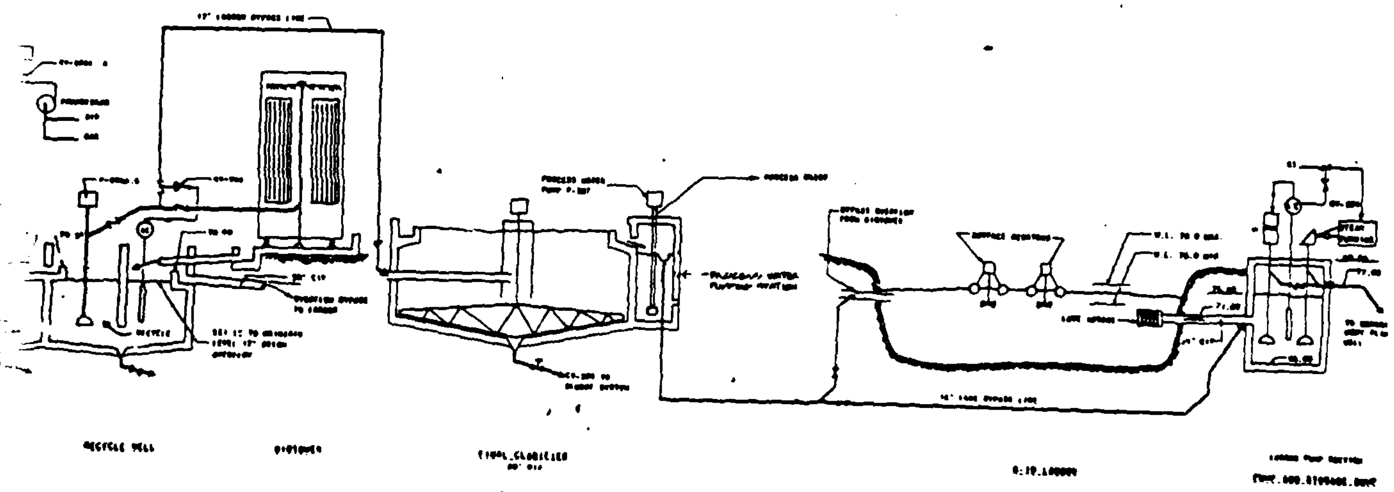


FIGURE 3-9. AFP 6 GENERAL INDUSTRIAL WASTE TREAT



IWG FLOW SHEET

AL INDUSTRIAL WASTE TREATMENT SYSTEM

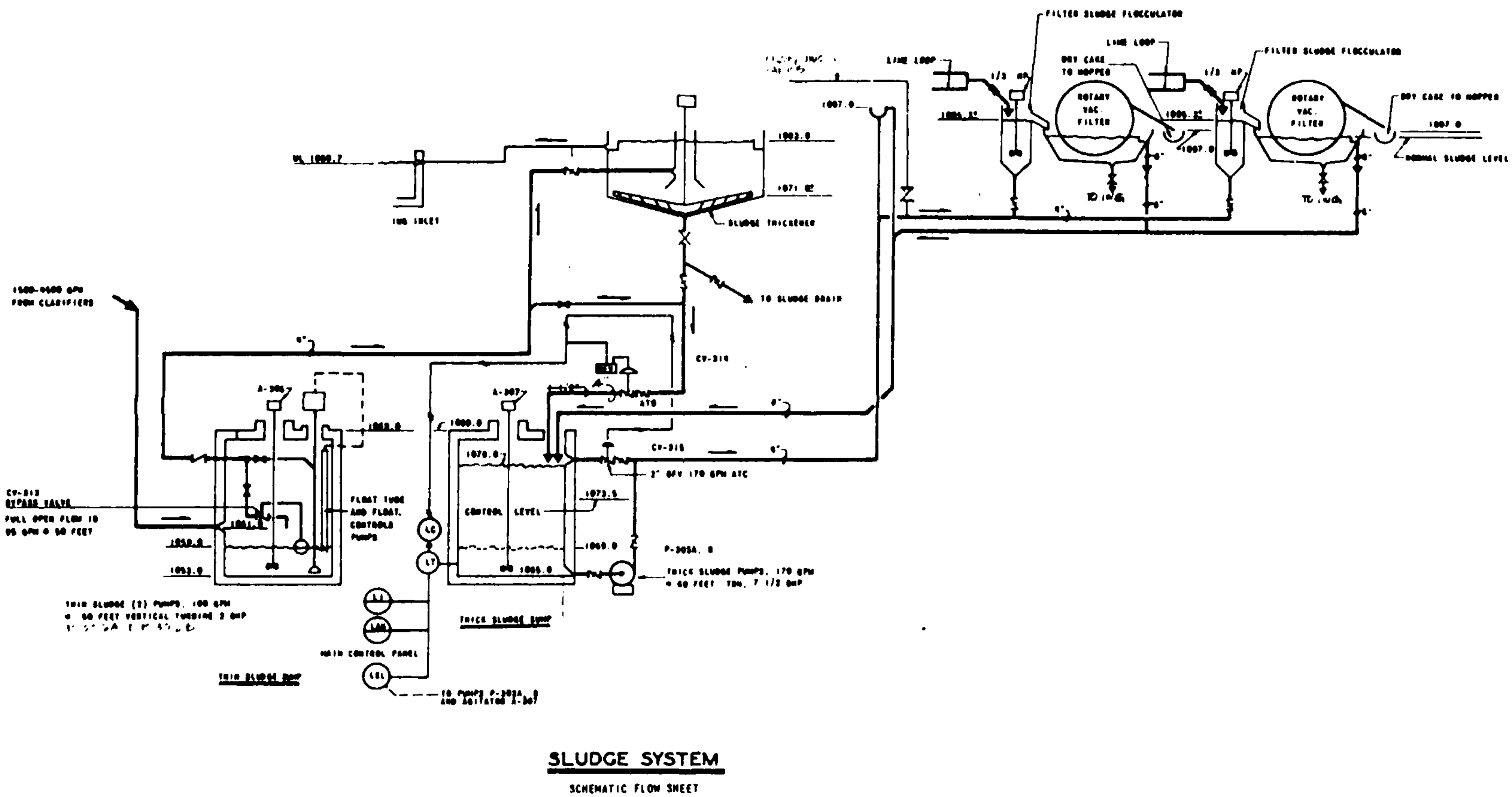


FIGURE 3-10. AFP 6 SLUDGE TREATMENT SYSTEM

TABLE 3-6
AFP 6 INDUSTRIAL WASTE FLOWS

SYSTEM	1982 FLOW(1) (MG)	1984 FLOW (2) (MG)	DESIGN CAPACITY (MG/YEAR)
IWO	151	179	183
IWC	0.18	1.05	--
IWG	353	587	1,278

(1) Flow data for 1982 from Installation Restoration Program Records Search, March, 1984.
(2) Flow data for 1984 from Lockheed records. IWC flow obtained by totalling tank dump records.

will be closed in the near future. Sludge is now being accumulated for eventual disposal at an off-site hazardous waste landfill. Based on typical disposal fees of $0.045/lb and transportation costs of $780/load, it is estimated that sludge disposal costs will be approximately $150,000/yr.

3.12.2 Waste Minimization Opportunities

Several improvements to the IWT systems could potentially serve to reduce sludge generation below current levels. These include:

1. Improvement of dewatering equipment
2. Increase in IWC system capacity
3. Improvement in IWO system capacity and methods
4. Use of high-performance coagulants.

Each of these opportunities is discussed below. In addition, sludge could potentially be incinerated on-site to minimize the quantities of waste requiring off-site disposal. This opportunity is described further in Section 3.16.

3.12.2.1 Improved Sludge Dewatering

The Air Force has recently approved Lockheed's funding request to improve sludge dewatering capabilities. The two existing rotary drum vacuum filters are to be replaced with more efficient filter presses which will discharge into roll-off containers for disposal. IWT sludge currently contains approximately 20 percent solids. Lockheed estimates that the planned filter presses will increase the solids content to 40 percent or more, resulting in a 50 percent decrease in sludge production.

3.12.2.2 Increased IWC Storage Capacity

IWC system capacity is currently limited to treating four 24,000-gallon batches of wastes at one time. As was shown in Table 3-6, IWC system flows have increased almost six-fold since 1982. To provide sufficient capacity for receiving tank dumps, it is often necessary for Lockheed to utilize purchased materials to neutralize concentrated wastes. If IWC system storage capacity were increased, it would be possible to react more acidic and caustic wastes together to acheived desired pH adjustments rather than adding purchased chemicals to the waste stream. The impact of this capacity increase would be lower sludge generation rates.

Further, as described in Section 3.9, the IWG clarifier has been bypassed and is now used for storage of chem mill waste prior to loading into tank cars for off-site treatment. This lowers the overall system efficiency and, in the event of a chromium spill into the IWG system, would probably result in a violation of discharge restrictions. Neither the extent of sludge reduction achievable by increasing IWC storage capacity nor the equipment and capital requirements have been identified, as the resources required to do so accurately are beyond the scope of this study. However, rough preliminary estimates indicate that sludge production could be decreased by approximately 10 percent, resulting in avoided disposal costs of approximately $15,000/year.

In addition, chemical purchases could be reduced and the system's capability for treating chrome releases improved by increasing storage capacity.

3.12.2.3 Improved IWO Treatment

The IWO system (Figure 3-2) currently utilizes gravity separation, air flotation and skimming techniques to remove free-floating oils for on-site incineration. Ferrous sulfate is added to the raw wastes to coagulate remaining oils and solids. IWO effluent is neutralized with slurried lime prior to discharge to the AFP 6 sewage treatment plant. Sludge from the IWO system is piped to the sludge treatment system for dewatering and filtering. The final IWT sludge contains 8 to 16 percent oils.

The IWO system is often required to operate above its 0.5 MGD capacity, resulting in the discharge of excessive oil in the IWO sludge streams. System renovation or flow reduction is required to allow proper separation of oils from the IWO stream. The Air Force has approved Lockheed's funding request to conduct limited renovation of the total IWT system, which will include evaluations of flow reduction potential in the IWO system and an increase of treatment plant capacity, as needed. These planned improvements should reduce the amount of oil currently entering the plant sludge.

IWO wastes could potentially be treated using ultrafiltration to achieve better oil/water separation and reduce ferrous sulfate use. Ultrafiltration, which has only recently been applied to wastewater treatment, is similar in operation to

reverse osmosis. In ultrafiltration, wastewater is forced, under pressure, through a membrane filter which does not allow large molecules (such as oils) to pass. Although experience with large-scale application of ultrafiltration is limited, it does appear that ultrafiltration may be suitable for use at AFP 6.

Insufficient IWO characterization data are available for accurate system costing. However, it does appear that significant reductions in sludge generation could be achieved through ultrafiltration. The most recent available sludge characterization indicates typical oil concentrations of 8 to 16 percent. If ultrafiltration could achieve a 12 percent reduction in sludge volume, off-site disposal rates could be reduced by 23,000 gal/yr or more, resulting in a $18,000/yr cost savings. Ultrafiltration may also reduce ferrous sulfate usage and improve the filterability of IWT sludge, allowing further reductions in sludge generation rates.

3.12.2.4 Use of High-Performance Coagulants

Ferrous sulfate is currently used at AFP 6 to coagulate solids and promote floc formation. Recently developed, low molecular weight cationic coagulants could potentially be used in place of ferrous sulfate to reduce sludge generation. These new coagulatns not only generate less sludge, they do not consume alkalinity (as does ferrous sulfate) and may allow a reduction in lime usage with an accompanying additional decrease in sludge production.

Costs associated with a switchover to cationic coagulants appear to be minimal. Determination of operating cost impacts and sludge reductions achievable will require actual bench-scale testing.

3.12.3. Recommendations

It is recommended that Lockheed proceed with the planned improvement of filteirng capability, evaluations of flow reduction opportunities and implementation of needed capacity increases. These studies should include an assessment of the costs and impacts of increasing IWC storage capacity. In addition, it is recommended that Lockheed evaluate the feasibility of utilizing ultrafiltration and high-performance coagulants in the AFP 6 IWT systems to further reduce sludge generation.

3.13 SEALANT WASTE

Approximately 7,700 gal/yr of sealant wastes are generated at AFP 6 during the sealing of fuel tanks. The waste consists primarily of cans, applicators and rags contaminated with the chrome-bearing hardened sealant. No opportunities to minimize this waste stream have been identified.

3.14 FIRE FIGHTING FOAM WASTE

Approximately 330 gallons of fire fighting foam were discarded as waste from AFP 6 in 1984. The foam is drained from emergency fire protection equipment as a precautionary measure approximately once every two years as its useful storage life is reached. No opportunities for waste minimization have been identified.

3.15 SOLVENT VAPOR LOSSES

3.15.1 Waste Description and Management Practices

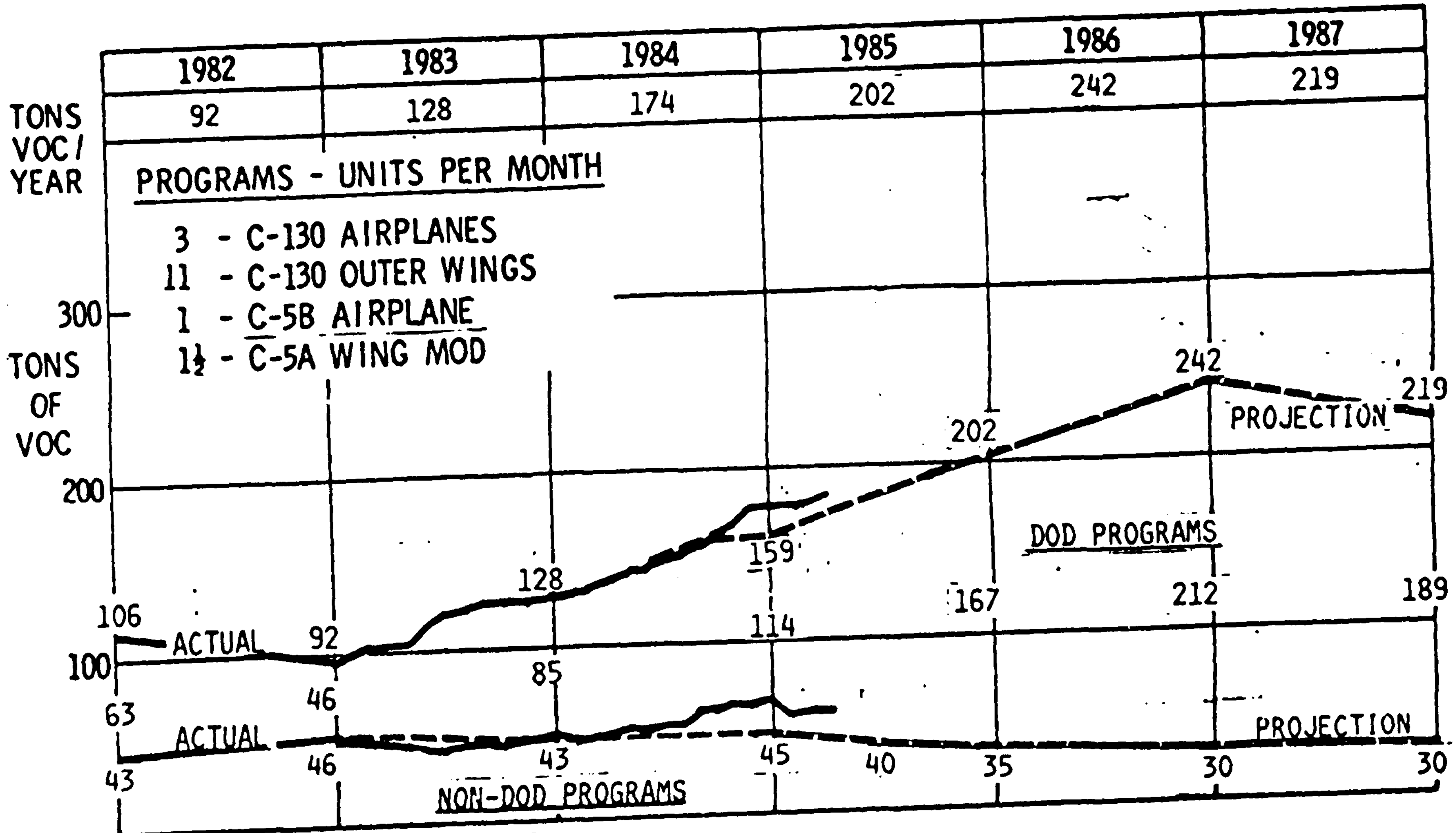
Solvent vapors are lost to the atmosphere from numerous sources at AFP 6. The major sources of solvent vapor emissions are aircraft and part painting operations, masking operations prior to chemical milling and part cleaning operations (including vapor degreasing). Emissions of volatile organic carbon (VOC) compounds regulated by the State of Georgia were estimated to be 174 tons in 1984. (Total volatile emissions were slightly higher as certain solvents, such as 1,1,1-trichloroethane, are not considered VOC's by Georgia). Figure 3-11 presents past and future VOC emissions from AFP 6 as projected by Lockheed in January, 1985.

3.15.2 Waste Minimization Opportunities

Lockheed has initiated several measures to reduce AFP 6 VOC emissions, including a switchover to electrostatic and airless spray equipment, use of water-borne temporary protective coatings and continuing emphasis on training painters and inspectors. In July, 1985 Lockheed was notified by the Georgia Department of Natural Resources that recent regulatory changes would require significant reductions in VOC emissions over time, with an eventual limitation of 25 tons VOC/yr from surface coating of miscellaneous metal parts and 100 tons VOC/yr from "major sources".

FIGURE 3-11

VOC Emission Projection – Five-Year Forecast



REVISION #2, DATED 1-10-85

Lockheed has prepared a plan to achieve compliance with Georgia's revised VOC emission requirements. Short term actions being undertaken by Lockheed include:

1. Covering the chem mill maskant dip tank in 1985 to reduce VOC emissions during periods when the tank is not in use.

2. Evaluation of use of exempt solvents in chem mill masking operations.

3. Measurement and analysis of all VOC sources at AFP 6.

4. Evaluation of alternative control technologies.

5. Development of conceptual designs for control technologies and product specification/changes which would provide significant VOC reductions.

6. Development of an overall compliance plan.

Further, Lockheed has identified long term actions to achieve the necessary VOC reductions. The key elements of these long term plans are:

1. Seek a waiver/exclusion for remaining chem mill masking emissions, as masking is not foreseen to be a long term operation at AFP 6.

2. Install vapor containment devices for controlling emissions from surface coating of miscellaneous metal parts and products, (carbon adsorption appears to be the most viable technology).

In the absence of a definition of "major sources", Lockheed considers such sources to be paint hanger coating operations at the B-3, B-77, B-78 and B-79 hangers. Peak emissions from these sources have been calculated by Lockheed to be 23.2 tons VOC/yr, which is well below the 100 ton/yr State limit. If Lockheed's interpretation of the State regulations is correct, no further reductions appear necessary for those operations.

3.15.3 Recommendations

It is recommended that Lockheed continue with the control technology evaluation and implementation strategy which it has developed. Additional measures which are recommended for inclusion Lockheed's evaluations are:

1. Use of emulsion scrubbing in water curtain paint booths as an alternative to carbon adsorption (refer to Section 3.3).

2. The recovery, distillation and reuse of solvents recovered by vapor-containment technologies to minimize increases in waste generation rates.

Further, it was noted that the compliance plan prepared by Lockheed stated that water-reduced epoxy primer (MIL-P-85582) has not been approved for use on Air Force weapons systems. Although the Air Force had previously rejected the use of water reduced primers on the C-5, this primer has, in fact, recently been approved for use on F-16 aircraft. In light of this development, reconsideration of it's potential for use on C-130 and C-5 programs may be appropriate.

3.16 WASTE INCINERATION

Many of the hazardous wastes generated at AFP 6 contain significant organic fractions, making them potential candidates for high temperature incineration. Lockheed has requested funding for the design and engineering of a dedicated, on-site system for the incineration of waste materials. A preliminary economic analysis of such a system is presented in this section.

3.16.1 System Description

Table 3-7 presents a tabulation of the hazardous wastes generated at AFP 6 which are potentially amenable to incineration for volume and mass reduction. This listing has been prepared on the assumption that the other minimization measures described in this report for those wastes are successfully implemented. Hence, the waste quantities presented in Table 3-7 are the residual or unrecoverable portions of the wastes. The exceptions are the waste paint sludges and waste fuels which can be most effectively treated through incineration. Current generation rates were utilized for those two waste streams.

Chlorinated solvent wastes, such as trichloroethylene and 1,1,1-trichloroethane, have not been included in Table 3-7 as their incineration does not appear to be advantageous. These solvents contain approximately 80 percent chlorine and would generate a greater volume of scrubber sludge than the volume of chlorinated solvents incinerated. The remaining wastes appear to have sufficiently low chlorine contents to eliminate the need for caustic scrubbing of incinerator emissions.

TABLE 3-7
WASTES AMENABLE TO HIGH-TEMPERATURE INCINERATION*

WASTE	QUANTITY AVAILABLE* (LBS/YEAR)	ESTIMATED HEAT (BTU/LB)	AVAILABLE HEAT (MMBTU/YEAR)
1. Tramp Oils from Coolant Recycle	31,700	18,000	571
2. Engine Oil & Hydraulic Fluid	35,600	18,000	641
3. Waste Paint Sludge	250,800	2,000	502
4. Waste Paints and Thinners	79,200	10,000	792
5. Waste Fuels	598,700	20,000	11,974
6. IWT Sludge	702,000	2,000	1,404
TOTALS	1,698,000	--	15,884

*Waste quantities have been calculated assuming that the minimization opportunities described in this report are implemented. The exceptions are waste paint sludge and waste fuels, which could be more effectively minimized through incineration.

The cumulative mass of waste available for incineration is calculated to be 849 tons/yr, of which 56 percent is sludge and 44 percent is liquid. Gross heat content is calculated to be 15,884 mmBtu/yr. Minimum incinerator loading capacities of 2 mmBtu/hr and 2200 lbs/hr are estimated based on a maximum availability of 7700 hours/yr (88 percent of capacity).

From these preliminary calculations, it appears that a small rotary kiln incinerator equipped with a secondary combustion chamber and venturi scrubber may be best suited to AFP 6's needs. A system with these features and a nominal heat release rating of 5 mmBtu/hr could be acquired for approximately $2 million. Engineering facilities and installation are expected to add $1 million to these costs and permitting $200,000. Total implementation costs are, therefore, estimated to be $3.2 million.

As current land disposal costs are significantly lower than projected incinerator O&M costs, no net savings would be realized. Rather, O&M costs could be expected to be approximately $350,000/yr (based on 3200 hrs/yr of operation at capacity). This is approximately $100,000/yr greater than the current land disposal costs for these wastes.

Some reduction in costs is possible if waste heat can be beneficially recovered from the process. Assuming 30 percent of the combustion heat is recoverable, approximately $30,000/yr in fuel cost savings are achievable. This would, however, entail additional capital costs of approximately $1 million for a heat recovery system.

A second drawback to on-site incineration is the extensive time required for implementation. Neglecting any time delays associated with obtaining system funding, the minimum time required for design, permit application preparation, regulatory review, public hearings, approval, construction, shakedown and certification testing is estimated to be 2.5 to 3 years.

Balancing these drawbacks is the ability of incineration to reduce waste streams not amenable to other treatment techniques. It is estimated that incineration of the wastes listed in Table 3-7 would produce approximately 370,000 lbs/yr of ash requiring hazardous waste land disposal. This constitutes a 65 percent reduction in the hazardous wastes incinerated. Scrubber water could presumably be routed to the AFP 6 waste treatment plant for removal of suspended solids and metals.

3.16.2 Recommendations

It is recommended that Lockheed evaluate on-site incineration of organic wastes not amenable to reduction through other means. As the preliminary analysis provided here reveals that a small incinerator system would only be utilized at 36 percent capacity to incinerate hazardous wastes, consideration should be given to operating the system as a heat recovery system with nonhazardous plant waste for the remaining 64 percent of its available unused capacity. In the nonhazardous mode, ash would not require management as a hazardous waste and more efficient (i.e., lower temperature) operating conditions would be allowed. This approach may reduce system operating costs to the point where operating cost savings can be realized over land disposal practices.

APPENDIX A

APPENDIX A
AFP 6 - LOCKHEED:
UNIT WASTE MANAGEMENT COSTS

1. Chemical Waste Management
   Emelle, Alabama

   See attached schedule.

2. GSX Services
   Pinewood, South Carolina

   See attached schedule.

3. Arivec Chemical, Inc.
   Douglasville, Georgia

   A. Recycleable oils, solvents $0.15/gal

   B. Contaminated fuel $0.45/gal

4. DuPont Environmental Services
   Deepwater, New Jersey

   A. Spent chem mill caustic

- Transport	$0.01936/lb
- Disposal	$0.03818/lb
- Demurrage	$0.0164/lb
- Tank cleaning	$600/car (17,500 gal each)

Emelle, Alabama
Price Schedule
Effective July 1, 1985

		DRUMMED WASTES	55/Gallon Drum
I.	INORGANIC	SOLIDS	$ 47.00
II.	INORGANIC	LIQUIDS	$ 70.00
III.	INORGANIC	SLUDGES *	$ 77.00
IV.	ORGANIC SOLIDS		$ 54.00
	A. Must Pass Paint Filter Test		
	B. Biodegradable or Compressible Absorbents are Not Acceptable.		
V.	ORGANIC LIQUIDS (Drums must empty per RCRA definition).		
	A. Non-fuels or non-recycle		$ 161.00
	B. For fuels or recycle program		
	1. < 1% Halogen		$ 62.00
	2. < 8% Halogen		$ 84.00
	3. > 8% Halogen		$ 110.00
VI.	ORGANIC SLUDGES *		
	A. Non-fuel or non-recycle		$ 174.00
	B. Liquid layer for fuel or recycle program		
	1. < 1% Halogen		$ 99.00
	2. < 8% Halogen		$ 144.00
VII.	LAB PACKS		$ 100.00 **
VIII.	85 GALLON OVERPACKS		$ 25.00/Surcharge
IX.	EMPTY DRUMS (Not crushed)		$ 25.00
X.	SULFIDES and CYANIDES		
	A. Solids (Less than 5%)		$ 80.00
	B. Sludges * = Less than 0.01%		$ 161.00
	C. Liquids = Less than 0.01%		$ 110.00
XI.	WASTE STREAM EVALUATION CHARGE		$ 150.00 per sample

* ALL sludges must be in open top drums
** Plus $20.00 per drum evaluation fee

DEFINITIONS

ORGANIC WASTE:	Any waste containing 10% or greater non-halogenated organic components or greater than 0.1% halogenated organic components.
HALOGENATED ORGANIC WASTE:	Any waste containing greater than 1% halogenated organic components.
INORGANIC WASTE:	Any waste containing less than 10% non-halogenated organic components and/or less than 0.1% halogenated organic components.
SLUDGE WASTE:	Any waste containing solid materials which cannot be completely removed from the drum by pumping. Drummed organic sludges must be shipped in DOT type 17-H open-head or ring-top drums.
BULK SOLID WASTES:	Inorganic and/or organic liquids or sludges must not be solidified with absorbents of any kind to produce a bulk solid waste.

Emelle, Alabama
Transportation Rates
Effective July 1, 1985

A.	Tankers	\$ 3.80 per loaded mile
B.	Roll Off Movements	\$ 3.50 per loaded mile
C.	Other Tractor Trailers	
	1. MS, AL	\$ 3.35 per loaded mile
	2. LA, AR, TN, FL, GA	\$ 3.30 per loaded mile
	3. All other states	\$ 3.20 per loaded mile
D.	Straight-Frame Truck	\$ 2.70 per loaded mile
E.	Demurrage (after first hour and a half)	\$ 60.00 per hour
F.	Roll-Off Box Rentals May be Quoted as Follows: (one-year lease):	
	1. Dedicated Boxes:	
	a. Open Top	\$256.00 per box per month
	b. Closed Top	\$380.00 per box per month
	2. Pool Boxes:	
	a. Open Top	\$256.00 per box
	b. Closed Top	\$380.00 per box
G.	Liners	\$ 60.00 each (dump or roll off)

GSX

GSX Corporation
Chemical Services Group
P O. Box 210799
100 Executive Center Drive
Santee Building, Suite 128
Columbia, South Carolina 29221
(803) 798-2993

GSX SERVICES OF SOUTH CAROLINA

Pinewood, S.C.

Price Schedule Effective July 15, 1985

HAZARDOUS WASTE

Bulk Solids (Assume 1 cu. yd. = 2000 lbs. - $.045/lb.)
Bulk Semi-Solids - $.065/lb. (require further treatment)
Bulk Liquids ----- $.0875/lb. (no change)
Drummed Liquids -- $80.00/drum (45-55 gal.)
Drummed Liquids -- $60.00/drum (30-40 gal.)
Drummed Liquids -- $40.00/drum (5-25 gal.)
Drummed Solids --- $50.00/drum (45-55 gal.)
Drummed Solids --- $38.00/drum (30-40 gal.)
Drummed Solids --- $25.00/drum (5-25 gal.)

NON-HAZARDOUS WASTE (i.e. South Carolina DHEC Code #7777)

Bulk Solids (Assume 1 cu. yd. = 2000 lbs.) - $.03/lb.
Bulk Semi-Solids - $.065/lb (requiring further treatment)
Bulk Liquids ----- $.0875/lb. (no change)
Drummed Liquids -- $75.00/drum (45-55 gal.)
Drummed Liquids -- $56.00/drum (30-40 gal.)
Drummed Liquids -- $38.00/drum (5-25 gal.)
Drummed Solids --- $45.00/drum (45-55 gal.)
Drummed Solids --- $34.00/drum (30-40 gal.)
Drummed Solids --- $23.00/drum (5-25 gal.)

MISCELLANEOUS COSTS

Minimum Order Charge --- $500.00
Overpack Surcharge (i.e. 85. gal.) - $25.00
Empty Drums (i.e.less than 1 inch residue) - $25.00
Demurrage (after first 2 hours) - $60.00/hour

APPENDIX B

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 9-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: MACHINE COOLANTS

CHARACTERISTICS: 5% WATER SOLUBLE CUTTING OIL
95% WATER

(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM MACHINING OPERATIONS THROUGHOUT AFP 6.

DRAINED TO OILY WASTE TREATMENT SYSTEM.

SLUDGE TO LANDFILL & TREATED WATER TO SANITARY SEWER DISCHARGE & OIL INCINERATED ON-SITE

GENERATION
1. RATE: 332,200 GAL/YR (1984)
2. FREQUENCY: DAILY
3. COST:

PROPOSED CHANGES: CHANGING TO TRIMSOL FOR EXTENDED LIFE.

INSTALLING ALMCO CYCLONIC FILTRATION SYSTEM FOR 4 MACHINES W/ 12,474 GAL OF SUMPS. (LOCKHEED PROPERTY)

RAW MATERIAL DATA
1. CHARACTERISTICS: UNION 10-B
2. QUANTITY: 16,610 GAL (1984)
3. COST: $3.09/GAL

NOTES: SMALLER MACHINES IN B-1, 4, 6, 21, 28, 64 REQUIRE CHANGE EVERY WEEK – W/TRIMSOL EXPECT ONCE/MONTH.

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: ENGINE OIL & HYDRAULIC FLUID

CHARACTERISTICS: ESTIMATED TO BE 90% HYDRAULIC OIL AND 10% ENGINE OIL

(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM ANNUAL CHANGEOUT OF HYDRAULIC OILS IN MACHINES AS WELL AS MOTOR OILS FROM B-80 (TRANSPORTATION)

IN DRUMS TO ARIVEL FOR RECYCLING

GENERATION
1. RATE: 24,975 GAL (1984)
2. FREQUENCY: PERIODIC
3. COST: $3746 (1984)

PROPOSED CHANGES:

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY:
3. COST:

NOTES: USE H&H INDUSTRIAL FILTERS TO EXTEND LIFE

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: WASTE PAINT SLUDGE

CHARACTERISTICS: 25-30% DRY SOLIDS, 7-10% OIL,
5-10% POLYVINYL ACETATE, 5-10% ACRYLIC RESIN,
8-15% INORGANIC COMPOUNDS
(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM PAINT BOOTH WATER CURTAIN SKIMMING.

STORED IN DRUMS FOR LANDFILLING BY CHEM WASTE.

GENERATION
1. RATE: 33,440 GAL (1984)
2. FREQUENCY: PERIODIC
3. COST: $112,760 (1984)

PROPOSED CHANGES: 1985 PROJECTED RATE IS 32,560 GAL

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY:
3. COST:

NOTES:

SALES CODE

MFR | № 27751

Chemical Waste Management

GENERATOR'S WASTE MATERIAL PROFILE SHEET

GENERAL DIRECTIONS: In order for us to determine whether we can lawfully, safely and environmentally transport, store, treat or dispose of your waste stream, we must ask certain information about your waste. All of the information we seek is necessary, for our purposes and yours. Be complete in your answers: if your response is "none," so indicate. Answers must be in ink or typewritten. Information you provide will be maintained in strictest confidence. Please make a copy of this form for your records, returning the original to the location indicated below.

THIS FORM AND ANY SUPPLEMENTAL INFORMATION SHOULD BE RETURNED TO:

CHEMICAL WASTE MANAGEMENT, INC.	SEND SAMPLES DIRECT TO:
2131 KINGSTON COURT, S.E.	CHEMICAL WASTE MANAGEMENT
SUITE 112	P. O. BOX 55/HWY. 17, MILE MARKER 163
MARIETTA, GEORGIA 30067	EMELLE, ALABAMA 35459
	ATTN: CHIEF CHEMIST

1. **GENERATOR NAME:** Lockheed-Georgia Company
2. **GENERATING FACILITY NAME/ADDRESS:** Marietta, Georgia
   S Cobb Dr 30063
3. **COMPANY CONTACTS:**

GENERAL	C. F. Griffin	TITLE Pollution Coordinator	PHONE (404) 424-3114
		TITLE	PHONE
TECHNICAL	A. L. Reddoch	TITLE Supervisor-IWT	PHONE (404) 424-3577
		TITLE	PHONE

4. **WASTE NAME:** #03152 Paint Sludge (Guardian Industrial Services, Inc.)
5. **PROCESS GENERATING WASTE:** Aircraft and Painting

WASTE PROPERTIES:

A. ORGANIC ☐ INORGANIC ☐ HAS BOTH ORGANIC AND INORGANIC COMPONENTS ☐

B. PHASES/LAYERS: BILAYERED ☐ MULTILAYERED ☐ NONE ☐

C. PHYSICAL STATE AT 70°F: SOLID ☐ SEMI-SOLID ☒ LIQUID ☐ POWDER ☐ OTHER: ______

D. SOLIDS: TOTAL (%): 28 - 31 TOTAL DISSOLVED (ppm or %): 6.0 - 5.5

E. SPECIFIC WEIGHT (AS # PER UNIT): 5.5 - 9.5 # gallon

F. pH: 6.1 (Show the following as range of %)

AS:				
H_2SO_4	None - %		H_3PO_4	None - %
HC1	None - %		NaOH	None - %
HF	None - %		NH_4OH	None - %
HNO_3	None - %		$Ca(OH)_2$	0.1 - 0.5 %
OTHER:	- %			- %
	- %			- %

G. FLASH POINT: None at the Boil °F CLOSED CUP ☒ OPEN CUP ☐

H. VAPOR PRESSURE (in mm of Hg at 25°C): ______

I. BTU PER #: 1200 - 1800 ASH CONTENT 9 - 10% %

J. HALOGENATED? Trace (0.05-0.1%) % SULFONATED? None %

K. ALPHA RADIATION AS pCi/l: None

6. WASTE COMPOSITION:

A. ORGANIC COMPONENTS (WITH RANGES — INDICATE WHETHER % OR ppm)

Polyvinyl Acetate	5 - 10%		-
Resin (Acrylic)	5 - 10%		-
	-		-
	-		-

(ATTACH ADDITIONAL PAGES IF NECESSARY)

B. HEAVY METALS (WITH ppm RANGES):

	DISSOLVED	SUSPENDED		DISSOLVED	SUSPENDED
Ag			Hg		
As			Ni		
Ba			Pb	30 - 50 ppm	
Cd			Se		
Cr		1600 - 2000 ppm	Zn	1000 - 1500 ppm	
Cu		10 - 20 ppm	Other (specify)	Sodium	1500 - 2000 ppm

C. INORGANIC COMPONENTS (WITH % RANGES):

		OTHER	
TOTAL CYANIDE	None - %	Sulfates	2 - 3 %
FREE CYANIDE	None - %	Magnesium	1 - 2 %
SULFIDE AS:	None - %	Silicon Dioxide	2 - 3 %
BISULFITE AS:	None - %	Calcium Carbonate	1 - 2 %
SULFITE AS:	None - %	Manganese (PO_4)	1 - 2 %

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. DOES THIS WASTE STREAM CONTAIN BIOLOGIC MATERIALS, PATHOGENS, OR ETIOLOGICAL AGENTS? No

E. IF WASTE IS A PESTICIDE OR PRODUCED BY A PESTICIDE MANUFACTURING PROCESS, CHECK THE FOLLOWING:

THE WASTE CONTAINS:

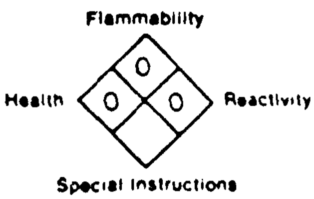
- ☐ ORGANOPHOSPHATES — CONTAINING SULFUR ☐ YES ☐ NO
- ☐ CARBAMATES
- ☐ CHLORINATED HYDROCARBONS

7. HAZARDOUS COMPONENTS AND CHARACTERISTICS

A. HAZARDOUS PROPERTIES (INSERT NUMBER CODES PER INSTRUCTIONS ON LAST PAGE)

(1) TOXICITY RATING: INHALATION 0 DERMAL 0 ORAL 2

(2) HAZARD IDENTIFICATION SYSTEM:



B. IS THIS WASTE A "HAZARDOUS MATERIAL" AS DEFINED BY REGULATIONS OF THE U.S. DEPARTMENT OF TRANSPORTATION PURSUANT TO THE HAZARDOUS MATERIALS TRANSPORTATION ACT? Yes
(SEE 49 CFR 172.101 AND 173 FOR "HAZARDOUS MATERIALS" LIST AND CHARACTERISTICS) IF SO, PLEASE ADVISE OF THE FOLLOWING.

(1) CORRECT SHIPPING DESCRIPTION: Inorganic/Organic Paint Sludge

(2) HAZARD CLASS(ES) Toxic (Ingestion Only)

(3) IDENTIFICATION NUMBER (FROM HAZARDOUS MATERIALS LIST) [illegible]

C. DOES THIS WASTE CONTAIN ANY "HAZARDOUS SUBSTANCE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT? [illegible] (SEE 40 CFR 116 FOR "HAZARDOUS SUBSTANCES" AND CATEGORIES.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) THE NAMES OF EACH HAZARDOUS SUBSTANCE PRESENT IN THE WASTE (INDICATING HAZARD CATEGORY — A, B, C, D, X):
X - Polyvinyl Acetate and Organic Resin (Acrylic)

(ATTACH ADDITIONAL PAGES IF NECESSARY)

(2) THE NAMES OF EACH SUCH SUBSTANCE WHICH MAY BE PRESENT IN CONCENTRATIONS GREATER THAN 10% BY WEIGHT (SHOWING PROBABLE % RANGE): None

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 3001 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? ______
(THIS PART NEED NOT BE COMPLETED UNTIL PROMULGATION OF FINAL 3001 REGULATIONS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) IF THE WASTE IS A LISTED HAZARDOUS WASTE, STATE:

(a) THE LISTED DESCRIPTION OF THE WASTE: Sludge, Paint D007

(b) THE HAZARD CRITERIA FOR WHICH THE WASTE IS LISTED: Oral Toxicity

(2) IF THE WASTE IS NOT LISTED, WHAT HAZARDOUS CHARACTERISTIC(S) DOES IT POSSESS?

8. IS THE INFORMATION PROVIDED IN SECTIONS 5-7 BASED UPON LABORATORY ANALYSIS OF THE WASTE MATERIAL? Yes . IF SO, PLEASE ADVISE OF THE DATE OF THE MOST RECENT ANALYSIS: [illegible] 17, 19[illegible]

9. HAVE YOU OBTAINED TOXICITY STUDIES OF THIS WASTE STREAM? No IF SO, PLEASE ATTACH A COPY OF THE RESULTS.

10. QUANTITY/SHIPPING REQUIREMENTS:

ANTICIPATED VOLUME IS: 6

GALLONS ☐ TONS ☐ CUBIC YARDS ☐ DRUMS ☒ OTHER ☐ ______

PER: DAY ☐ WEEK ☒ MONTH ☐ YEAR ☐ ONE TIME ☐

TRANSPORTATION EQUIPMENT REQUIRED: Tractor Trailer Truck

SERVICE/SCHEDULING REQUIREMENTS: On Call

GENERATOR'S AUTHORIZED SIGNATORY: [signature] TITLE Supv.-I&T DATE 5/1[illegible]

CONFIDENTIALITY AGREEMENT [illegible handwriting] as consideration for the Generator's release of the above information, and any other supplemental data provided, agrees to treat such information as confidential property and will not disclose such information to others except as is required by law, and in such circumstances only after first giving notice to the Generator.

By [signature]
Name

[illegible handwriting]
Title

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 06214 Date Received Aug. 31, 1984

Waste Name/Generating Process: Group A - Paint Sludge

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State (70°F): Solid X Semi-Solid ____ Liquid ____

Powder ____ Other ____

Color: Green Odor: ____

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point N/A °F

CORROSIVITY (Ref. 40 CFR 261.22)

pH 6.12

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23) * Sulfur - by Bomb Calorimeter

Total cyanide NONE %

Free cyanide NONE %

*Total Sulfur NONE %

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag	0.001	Cr	673
As	0.060	Hg	0.0011
Ba	0.070	Pb	0.013
Cd	0.899	Se	0.087

OTHERS (Ref 40 CFR 261.30) *GC/MS-qualitative only
GC - Capillary Column, FID

Organic Constituents (as % or ~~ppm~~)

Item	Conc
Acetone	0.026%
MEK	0.31 %
Benzene	0.003%
Toluene	0.014%
Xylene	0.01 %
Cellosolve Acetate	0.28 %
Water	39.5 %

ANALYST: [illegible] DATE: 10/30/84

APPROVED: [illegible] DATE: 10/30/84

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: WASTE PAINTS & THINNERS

CHARACTERISTICS: 60-80% MEK, 10-20% TCA, TCE + OTHER SOLVENTS, PAINT PIGMENTS

(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM CLEANUP AFTER PAINTING OPERATIONS AND SMALL-SCALE PART CLEANING.

ACCUMULATED IN DRUMS.

5115 GAL/YR TO ARNEC FOR RECYCLING

14,080 GAL/YR TO CHEM WASTE - FOR LANDFILL & INCINERATION
(14% IS CHLORINATED, 86% NONCHLORINATED)

GENERATION
1. RATE: 19,200 GAL (1984)
2. FREQUENCY: DAILY
3. COST: $21,600 (1984 NET)

PROPOSED CHANGES:

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY:
3. COST:

NOTES: EACH DRUM ANALYZED @ $200/DRUM TO DETERMINE SUITABILITY FOR RECYCLING.

SALES CODE

MAR	№ 27295

Chemical Waste Management

GENERATOR'S WASTE MATERIAL PROFILE SHEET

GENERAL DIRECTIONS: In order for us to determine whether we can lawfully, safely and environmentally transport, store, treat or dispose of your waste stream, we must ask certain information about your waste. All of the information we seek is necessary, for our purposes and yours. Be complete in your answers: if your response is "none," so indicate. Answers must be in ink or typewritten. Information you provide will be maintained in strictest confidence. Please make a copy of this form for your records, returning the original to the location indicated below.

THIS FORM AND ANY SUPPLEMENTAL INFORMATION SHOULD BE RETURNED TO:

CHEMICAL WASTE MANAGEMENT, INC.
2131 KINGSTON COURT, S.E.
SUITE 112
MARIETTA, GEORGIA 30067

SEND SAMPLES DIRECT TO:
CHEMICAL WASTE MANAGEMENT
P. O. BOX 55/HWY. 17, MILE MARKER 163
EMELLE, ALABAMA 35459
ATTN: CHIEF CHEMIST

1. GENERATOR NAME: LOCKHEED-GEORGIA COMPANY
2. GENERATING FACILITY NAME/ADDRESS: LOCKHEED-GEORGIA COMPANY, MARIETTA, GEORGIA 30063
3. COMPANY CONTACTS:

	Name	TITLE	PHONE
GENERAL	C. F. Griffin	Pollution Coordinator	(404) 424-3114
TECHNICAL	A. L. Reddoch	Supervisor-IWT	(404) 424-3577

4. WASTE NAME: Waste Paint & Thinners 23-13, 23-18, 23-16, 18-07 Unknown White Dr., 18-09
5. PROCESS GENERATING WASTE: Aircraft Painting

WASTE PROPERTIES:

A. ORGANIC ☒ INORGANIC ☐ HAS BOTH ORGANIC AND INORGANIC COMPONENTS ☐

B. PHASES/LAYERS: BILAYERED ☐ MULTILAYERED ☒ NONE ☐

C. PHYSICAL STATE AT 70°F: SOLID ☐ SEMI-SOLID ☒ LIQUID ☒ POWDER ☐ OTHER: ______

D. SOLIDS: TOTAL (%): 15 - 30 TOTAL DISSOLVED (ppm or %): 4 - 8%

E. SPECIFIC WEIGHT (AS # PER UNIT): 6 - 7.5 # per gallon

F. pH: N/A (Show the following as range of %)

AS:		%			%
H_2SO_4	None -	%	H_3PO_4	None -	%
HC1	" -	%	NaOH	" -	%
HF	" -	%	NH_4OH	" -	%
HNO_3	" -	%	$Ca(OH)_2$	" -	%
OTHER:	-	%		-	%
	-	%		-	%

G. FLASH POINT: 35 - 45 °F CLOSED CUP ☒ OPEN CUP ☐

H. VAPOR PRESSURE (In mm of Hg at 25°C): ______

I. BTU PER #: 16,000 - 17,500 ASH CONTENT 0.4 - 2.75 %

J. HALOGENATED? .1% % SULFONATED? No %

K. ALPHA RADIATION AS pCi/l: No

6. WASTE COMPOSITION:

A. ORGANIC COMPONENTS (WITH RANGES — INDICATE WHETHER % OR ppm)

Mixed Ketones	60 - 80%		-
(Hazardous Waste	-		-
Nos. F003, F005)	-		-
	-		-

(ATTACH ADDITIONAL PAGES IF NECESSARY)

B. HEAVY METALS (WITH ppm RANGES):

	DISSOLVED	SUSPENDED		DISSOLVED	SUSPENDED
Ag	None		Hg	None	
As	"		Ni	"	
Ba	"		Pb	"	
Cd	"		Se	"	
Cr	"		Zn		4000 - 12,000 ppm
Cu		15 - 50 ppm	Other (specify)		

C. INORGANIC COMPONENTS (WITH % RANGES): OTHER

TOTAL CYANIDE	None - %	Titanium Oxide	.1 - 1.5 %
FREE CYANIDE	" - %	Calcium	.01 - .25%
SULFIDE AS:	" - %		- %
BISULFITE AS:	" - %		- %
SULFITE AS:	" - %		- %

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. DOES THIS WASTE STREAM CONTAIN BIOLOGIC MATERIALS, PATHOGENS, OR ETIOLOGICAL AGENTS? No

E. IF WASTE IS A PESTICIDE OR PRODUCED BY A PESTICIDE MANUFACTURING PROCESS, CHECK THE FOLLOWING:

THE WASTE CONTAINS:

☐ ORGANOPHOSPHATES — CONTAINING SULFUR ☐ YES ☐ NO

☐ CARBAMATES

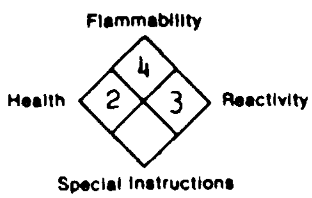
☐ CHLORINATED HYDROCARBONS

7. HAZARDOUS COMPONENTS AND CHARACTERISTICS

A. HAZARDOUS PROPERTIES (INSERT NUMBER CODES PER INSTRUCTIONS ON LAST PAGE)

(1) TOXICITY RATING: INHALATION 2 DERMAL 1 ORAL 3

(2) HAZARD IDENTIFICATION SYSTEM:



B. IS THIS WASTE A "HAZARDOUS MATERIAL" AS DEFINED BY REGULATIONS OF THE U.S. DEPARTMENT OF TRANSPORTATION PURSUANT TO THE HAZARDOUS MATERIALS TRANSPORTATION ACT? Yes (SEE 49 CFR 172.101 AND 173 FOR "HAZARDOUS MATERIALS" LIST AND CHARACTERISTICS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) CORRECT SHIPPING DESCRIPTION: Methyl Ethyl Ketone (Spent Solvent)

(2) HAZARD CLASS(ES): Flammable Liquid

(3) IDENTIFICATION NUMBER (FROM HAZARDOUS MATERIALS LIST): UN-1193

C. DOES THIS WASTE CONTAIN ANY "HAZARDOUS SUBSTANCE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT?______ (SEE 40 CFR 116 FOR "HAZARDOUS SUBSTANCES" AND CATEGORIES.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) THE NAMES OF EACH HAZARDOUS SUBSTANCE PRESENT IN THE WASTE (INDICATING HAZARD CATEGORY — A, B, C, D, X):
(C) Methyl Ethyl Ketone (EPA HAZARDOUS WASTE)
Number U-159

(ATTACH ADDITIONAL PAGES IF NECESSARY)

(2) THE NAMES OF EACH SUCH SUBSTANCE WHICH MAY BE PRESENT IN CONCENTRATIONS GREATER THAN 10% BY WEIGHT (SHOWING PROBABLE % RANGE): ______
Methyl Ethyl Ketone 60 -80%

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 3001 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? Yes
(THIS PART NEED NOT BE COMPLETED UNTIL PROMULGATION OF FINAL 3001 REGULATIONS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) IF THE WASTE IS A LISTED HAZARDOUS WASTE, STATE:

(a) THE LISTED DESCRIPTION OF THE WASTE: F-005 The Spent Non-Halogenated Solvent Methyl Ethyl Ketone and Homologs

(b) THE HAZARD CRITERIA FOR WHICH THE WASTE IS LISTED:
Flammability - Oral Toxicity

(2) IF THE WASTE IS NOT LISTED, WHAT HAZARDOUS CHARACTERISTIC(S) DOES IT POSSESS?

8. IS THE INFORMATION PROVIDED IN SECTIONS 5-7 BASED UPON LABORATORY ANALYSIS OF THE WASTE MATERIAL? Yes . IF SO, PLEASE ADVISE OF THE DATE OF THE MOST RECENT ANALYSIS: March, 1981

9. HAVE YOU OBTAINED TOXICITY STUDIES OF THIS WASTE STREAM? No IF SO, PLEASE ATTACH A COPY OF THE RESULTS.

10. QUANTITY/SHIPPING REQUIREMENTS:

ANTICIPATED VOLUME IS: 300

GALLONS ☐ TONS ☐ CUBIC YARDS ☐ DRUMS ☒ OTHER ☐ ______

PER: DAY ☐ WEEK ☐ MONTH ☐ YEAR ☒ ONE TIME ☐

TRANSPORTATION EQUIPMENT REQUIRED: Tractor Trailer

SERVICE/SCHEDULING REQUIREMENTS: On Call

GENERATOR'S AUTHORIZED SIGNATORY: PR Raddock TITLE Supervisor DATE 4/15/81

CONFIDENTIALITY AGREEMENT: Chemical Waste Management Inc.
as consideration for the Generator's release of the above information, and any other supplemental data provided, agrees to treat such information as confidential property and will not disclose such information to others except as is required by law, and in such circumstances only after first giving notice to the Generator.

By: Ralph Rutherford
Name
Technical Representative
Title

TOXICITY RATINGS

0 = No Toxicity

This designation is given to materials which fall into one of the following categories:

(a) Materials which cause no harm under any conditions of normal use.

(b) Materials which produce toxic effects on humans only under the most unusual conditions or by overwhelming dosage.

1 = Slight Toxicity

(a) *Acute local.* Materials which on single exposures lasting seconds, minutes, or hours cause only slight effects on the skin or mucous membranes regardless of the extent of the exposure.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose, regardless of the quantity absorbed or the extent of exposure.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years cause only slight and usually reversible harm to the skin or mucous membranes. The extent of exposure may be great or small.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slightly usually reversible effects following continuous or repeated exposures extending over days, months, or years. The extent of the exposure may be great or small.

In general, those substances classified as having "slight toxicity" produce changes in the human body which are readily reversible and which will disappear following termination of exposure, either with or without medical treatment.

2 = Moderate Toxicity

(a) *Acute local.* Materials which on single exposure lasting seconds, minutes, or hours cause moderate effects on the skin or mucous membranes. These effects may be the result of intense exposure for a matter of seconds or moderate exposure for a matter of hours.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce moderate effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years cause moderate harm to the skin or mucous membranes.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestirn, or through the skin and which produce moderate effects following continuous or repeated exposures extending over periods of days, months, or years.

Those substances classified as having "moderate toxicity" may produce irreversible as well as reversible changes in the human body. These changes are not of such severity as to threaten life or produce serious physical impairment.

3 = Severe Toxicity

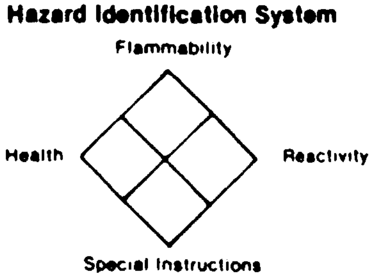
(a) *Acute local.* Materials which on single exposure lasting seconds or minutes cause injury to skin or mucous membranes of sufficient severity to threaten life or to cause permanent physical impairment or disfigurement.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which can cause injury of sufficient severity to threaten life following a single exposure lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years can cause injury to skin or mucous membranes of sufficient severity to threaten life or cause permanent impairment, disfigurement, or irreversible change.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestion or through the skin and which can cause death or serious physical impairment following continuous or repeated exposures to small amounts extending over periods of days, months, or years.

Hazard Identification System



The above diagram identifies the "health," "flammability" and "reactivity" (instability and water reactivity) of a chemical and indicates the order of severity of each hazard by use of one of five numeral gradings, from four (4), indicating the severe hazard or extreme danger, to zero (0), indicating no special hazard. In the diamond-shaped diagram "health" hazard is identified at the left, "flammability" at the top, and "reactivity" at the right. The bottom space is primarily used to identify unusual reactivity with water. A W with a line through its center W alerts fire fighting personnel to the possible hazard in use of water. This bottom space may be also used to identify a radiation hazard by the symbol ☢. Oxidizing chemicals are identified in the bottom space by OXY.

To supplement the spatial arrangement, NFPA No. 704M recommends the use of colored backgrounds or colored numbers to identify the hazard categories—blue for "health," red for "flammability," yellow for "reactivity."

For a detailed description of the hazard identification system used here, see "Recommended System for the Identification of the Fire Hazards of Materials, NFPA No. 704M, 1969 Edition."

The following paragraphs summarize the meanings of the numbers in each hazard category and explain what a number should tell fire fighting personnel about protecting themselves and how to fight fires where the hazard exists.

Health

4 A few whiffs of the gas or vapor could cause death; or the gas, vapor, or liquid could be fatal on penetrating the fire fighters' normal full protective clothing which is designed for resistance to heat. For most chemicals having a Health 4 rating, the normal full protective clothing available to the average fire department will not provide adequate protection against skin contact with these materials. Only special protective clothing designed to protect against the specific hazard should be worn.

3 Materials extremely hazardous to health, but areas may be entered with extreme care. Full protective clothing, including self-contained breathing apparatus, rubber gloves, boots and bands around legs, arms and waist should be provided. No skin surface should be exposed.

2 Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus.

1 Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus.

0 Materials which on exposure under fire conditions would offer no health hazard beyond that of ordinary combustible material.

Flammability

4 Very flammable gases, very volatile flammable liquids, and materials that in the form of dusts or mists readily form explosive mixtures when dispersed in air. Shut off flow of gas or liquid and keep cooling water streams on exposed tanks or containers. Use water spray carefully in the vicinity of dusts so as not to create dust clouds.

3 Liquids which can be ignited under almost all normal temperature conditions. Water may be ineffective on these liquids because of their low flash points. Solids which form coarse dusts, solids in shredded or fibrous form that create flash fires, solids that burn rapidly, usually because they contain their own oxygen, and any material that ignites spontaneously at normal temperatures in air.

2 Liquids which must be moderately heated before ignition will occur and solids that readily give off flammable vapors. Water spray may be used to extinguish the fire because the material can be cooled to below its flash point.

1 Materials that must be preheated before ignition can occur. Water may cause frothing of liquids with this flammability rating number if it gets below the surface of the liquid and turns to steam. However, water spray gently applied to the surface will cause a frothing which will extinguish the fire. Most combustible solids have a flammability rating of 1.

0 Materials that will not burn.

Reactivity

4 Materials which in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. Includes materials which are sensitive to mechanical or localized thermal shock. If a chemical with this hazard rating is in an advanced or massive fire, the area should be evacuated.

3 Materials which in themselves are capable of detonation or of explosive decomposition or of explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. Includes materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures or which react explosively with water without requiring heat or confinement. Fire fighting should be done from an explosion-resistant location.

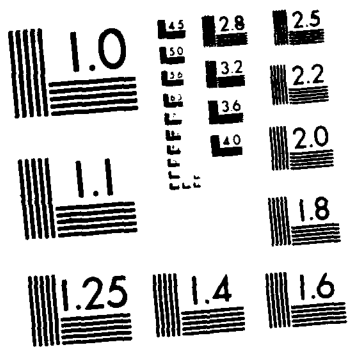
2 Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures or which can undergo violent chemical change at elevated temperatures and pressures. Also includes those materials which may react violently with water or which may form potentially explosive mixtures with water or generates toxic gases, vapors or fumes when mixed with water. In advanced or massive fires, fire fighting should be done from a protected location.

1 Materials which in themselves are normally stable but which may become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently. Caution must be used in approaching the fire and applying water.

0 Materials which are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used.

AD-A191 038 WASTE MINIMIZATION PROGRAM AIR FORCE PLANT 6(U) REL INC 2/2
BOYNTON BEACH FL 01 FEB 86 ASD/PMDA-86-WMN-001
F09603-84-G-1462-SC01

UNCLASSIFIED F/G 24/3 NL



MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS 1963 A

SALES	CODE
MAR	№ 27294

Analysis No. 43-16-3 C

Chemical Waste Management

GENERATOR'S WASTE MATERIAL PROFILE SHEET

GENERAL DIRECTIONS: In order for us to determine whether we can lawfully, safely and environmentally transport, store, treat or dispose of your waste stream, we must ask certain information about your waste. All of the information we seek is necessary, for our purposes and yours. Be complete in your answers: if your response is "none," so indicate. Answers must be in ink or typewritten. Information you provide will be maintained in strictest confidence. Please make a copy of this form for your records, returning the original to the location indicated below.

THIS FORM AND ANY SUPPLEMENTAL INFORMATION SHOULD BE RETURNED TO:

CHEMICAL WASTE MANAGEMENT, INC.	SEND SAMPLES DIRECT TO:
2131 KINGSTON COURT, S.E.	CHEMICAL WASTE MANAGEMENT
SUITE 112	P. O. BOX 55/HWY. 17, MILE MARKER 163
MARIETTA, GEORGIA 30067	EMELLE, ALABAMA 35459
	ATTN: CHIEF CHEMIST

1. GENERATOR NAME: LOCKHEED-GEORGIA COMPANY
2. GENERATING FACILITY NAME/ADDRESS: LOCKHEED-GEORGIA COMPANY MARIETTA, GEORGIA 30063
3. COMPANY CONTACTS:

GENERAL	C. F. Griffin	TITLE Pollution Coordinator	PHONE (404) 424-3114
		TITLE	PHONE
TECHNICAL	A. L. Reddoch	TITLE Supervisor-IWT	PHONE (404) 424-3577
		TITLE	PHONE

4. WASTE NAME: 81-6 (00979) D/72-58
5. PROCESS GENERATING WASTE: Aircraft Painting & Part Cleaning

WASTE PROPERTIES:

A. ORGANIC ☒ INORGANIC ☐ HAS BOTH ORGANIC AND INORGANIC COMPONENTS ☐

B. PHASES/LAYERS: BILAYERED ☐ MULTILAYERED ☒ NONE ☐

C. PHYSICAL STATE AT 70°F: SOLID ☐ SEMI-SOLID ☐ LIQUID ☒ POWDER ☐ OTHER: ______

D. SOLIDS: TOTAL (%): 7.38 TOTAL DISSOLVED (ppm or %): 6.75%

E. SPECIFIC WEIGHT (AS # PER UNIT): 7.33 # per gallon

F. pH: ______ (Show the following as range of %)

AS:	H_2SO_4	None - %	H_3PO_4	None - %
	HCl	" - %	NaOH	" - %
	HF	" - %	NH_4OH	" - %
	HNO_3	" - %	$Ca(OH)_2$	" - %
OTHER:	____	- %	____	- %
	____	- %	____	- %

G. FLASH POINT: 35 °F CLOSED CUP ☒ OPEN CUP ☐

H. VAPOR PRESSURE (in mm of Hg at 25°C): 192

I. BTU PER #: 15,750 ASH CONTENT 0.33 %

43-16-3 C

J. HALOGENATED? Yes % SULFONATED? No %

K. ALPHA RADIATION AS pCi/l: No

6. WASTE COMPOSITION:

A. ORGANIC COMPONENTS (WITH RANGES — INDICATE WHETHER % OR ppm)

Mixed Ketones	70 - 80%	Hazardous Waste	-
Trichloroethane	10 - 20	Nos. F002, F005	-
	-		-
	-		-

(ATTACH ADDITIONAL PAGES IF NECESSARY)

B. HEAVY METALS (WITH ppm RANGES):

	DISSOLVED	SUSPENDED		DISSOLVED	SUSPENDED
Ag	None		Hg	None	
As	"		Ni	"	
Ba	"		Pb	"	
Cd	"		Se	"	
Cr	"		Zn	"	
Cu		25	Other (specify)		

C. INORGANIC COMPONENTS (WITH % RANGES): OTHER

TOTAL CYANIDE	None - %	Zinc Oxide	0.3- 0.4 %
FREE CYANIDE	" - %		- %
SULFIDE AS:	" - %		- %
BISULFITE AS:	" - %		- %
SULFITE AS:	" - %		- %

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. DOES THIS WASTE STREAM CONTAIN BIOLOGIC MATERIALS, PATHOGENS, OR ETIOLOGICAL AGENTS? No

E. IF WASTE IS A PESTICIDE OR PRODUCED BY A PESTICIDE MANUFACTURING PROCESS, CHECK THE FOLLOWING:

THE WASTE CONTAINS:

☐ ORGANOPHOSPHATES — CONTAINING SULFUR ☐ YES ☐ NO

☐ CARBAMATES

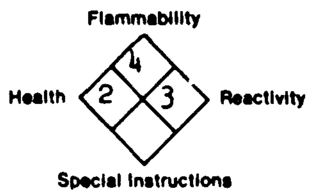
☐ CHLORINATED HYDROCARBONS

7. HAZARDOUS COMPONENTS AND CHARACTERISTICS

A. HAZARDOUS PROPERTIES (INSERT NUMBER CODES PER INSTRUCTIONS ON LAST PAGE)

(1) TOXICITY RATING: INHALATION 2 DERMAL 1 ORAL 3

(2) HAZARD IDENTIFICATION SYSTEM:



B. IS THIS WASTE A "HAZARDOUS MATERIAL" AS DEFINED BY REGULATIONS OF THE U.S. DEPARTMENT OF TRANSPORTATION PURSUANT TO THE HAZARDOUS MATERIALS TRANSPORTATION ACT? Yes (SEE 49 CFR 172.101 AND 173 FOR "HAZARDOUS MATERIALS" LIST AND CHARACTERISTICS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) CORRECT SHIPPING DESCRIPTION: Trichloroethane and Methyl Ethyl Ketone

(2) HAZARD CLASS(ES): Orm-A and Flammable Liquid

(3) IDENTIFICATION NUMBER (FROM HAZARDOUS MATERIALS LIST): UN-2831 and UN-1193

C. DOES THIS WASTE CONTAIN ANY "HAZARDOUS SUBSTANCE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT? Yes (SEE 40 CFR 116 FOR "HAZARDOUS SUBSTANCES" AND CATEGORIES.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) THE NAMES OF EACH HAZARDOUS SUBSTANCE PRESENT IN THE WASTE (INDICATING HAZARD CATEGORY — A, B, C, D, X):

(C) Trichloroethane (EPA HAZARDOUS WASTE NUMBER U-226)

(C) Ketones, Mixed (EPA HAZARDOUS WASTE NUMBER U-159)

(ATTACH ADDITIONAL PAGES IF NECESSARY)

(2) THE NAMES OF EACH SUCH SUBSTANCE WHICH MAY BE PRESENT IN CONCENTRATIONS GREATER THAN 10% BY WEIGHT (SHOWING PROBABLE % RANGE):

Trichloroethane (15)

Ketones (75)

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 3001 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? Yes

(THIS PART NEED NOT BE COMPLETED UNTIL PROMULGATION OF FINAL 3001 REGULATIONS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) IF THE WASTE IS A LISTED HAZARDOUS WASTE, STATE:

(a) THE LISTED DESCRIPTION OF THE WASTE: F-005 and F-002 Spent Halogenated and Non-Halogenated Solvents

(b) THE HAZARD CRITERIA FOR WHICH THE WASTE IS LISTED: Flammability and Oral Toxicity .

(2) IF THE WASTE IS NOT LISTED, WHAT HAZARDOUS CHARACTERISTIC(S) DOES IT POSSESS?

8. IS THE INFORMATION PROVIDED IN SECTIONS 5-7 BASED UPON LABORATORY ANALYSIS OF THE WASTE MATERIAL? Yes . IF SO, PLEASE ADVISE OF THE DATE OF THE MOST RECENT ANALYSIS: March, 1981

9. HAVE YOU OBTAINED TOXICITY STUDIES OF THIS WASTE STREAM? No IF SO, PLEASE ATTACH A COPY OF THE RESULTS.

10. QUANTITY/SHIPPING REQUIREMENTS:

ANTICIPATED VOLUME IS: 50

GALLONS ☐ TONS ☐ CUBIC YARDS ☐ DRUMS ☒ OTHER ☐

PER: DAY ☐ WEEK ☐ MONTH ☐ YEAR ☒ ONE TIME ☐

TRANSPORTATION EQUIPMENT REQUIRED: Tractor Trailer

SERVICE/SCHEDULING REQUIREMENTS: On Call

GENERATOR'S AUTHORIZED SIGNATORY: A R Reddoch TITLE Supervisor IW DATE 4/15/81

CONFIDENTIALITY AGREEMENT: Chemical Waste Management, Inc. as consideration for the Generator's release of the above information, and any other supplemental data provided, agrees to treat such information as confidential property and will not disclose such information to others except as is required by law, and in such circumstances only after first giving notice to the Generator.

By: Ralph Rutherford
Name

Technical Representative
Title

TOXICITY RATINGS

0 = No Toxicity

This designation is given to materials which fall into one of the following categories:

(a) Materials which cause no harm under any conditions of normal use.

(b) Materials which produce toxic effects on humans only under the most unusual conditions or by overwhelming dosage.

1 = Slight Toxicity

(a) *Acute local.* Materials which on single exposures lasting seconds, minutes, or hours cause only slight effects on the skin or mucous membranes regardless of the extent of the exposure.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose, regardless of the quantity absorbed or the extent of exposure.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years cause only slight and usually reversible harm to the skin or mucous membranes. The extent of exposure may be great or small.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slightly usually reversible effects following continuous or repeated exposures extending over days, months, or years. The extent of the exposure may be great or small.

In general, those substances classified as having "slight toxicity" produce changes in the human body which are readily reversible and which will disappear following termination of exposure, either with or without medical treatment.

2 = Moderate Toxicity

(a) *Acute local.* Materials which on single exposure lasting seconds, minutes, or hours cause moderate effects on the skin or mucous membranes. These effects may be the result of intense exposure for a matter of seconds or moderate exposure for a matter of hours.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce moderate effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years cause moderate harm to the skin or mucous membranes.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestim, or through the skin and which produce moderate effects following continuous or repeated exposures extending over periods of days, months, or years.

Those substances classified as having "moderate toxicity" may produce irreversible as well as reversible changes in the human body. These changes are not of such severity as to threaten life or produce serious physical impairment.

3 = Severe Toxicity

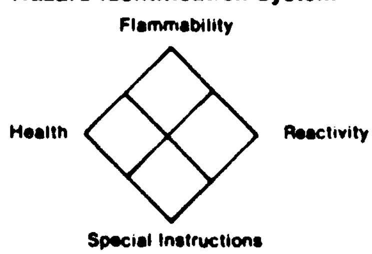
(a) *Acute local.* Materials which on single exposure lasting seconds or minutes cause injury to skin or mucous membranes of sufficient severity to threaten life or to cause permanent physical impairment or disfigurement.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which can cause injury of sufficient severity to threaten life following a single exposure lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years can cause injury to skin or mucous membranes of sufficient severity to threaten life or cause permanent impairment, disfigurement, or irreversible change.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestion or through the skin and which can cause death or serious physical impairment following continuous or repeated exposures to small amounts extending over periods of days, months, or years.

Hazard Identification System



The above diagram identifies the "health," "flammability" and "reactivity" (instability and water reactivity) of a chemical and indicates the order of severity of each hazard by use of one of five numeral gradings, from four (4), indicating the severe hazard or extreme danger, to zero (0), indicating no *special* hazard. In the diamond-shaped diagram "health" hazard is identifed at the left, "flammability" at the top, and "reactivity" at the right. The bottom space is primarily used to identify unusual reactivity with water. A W with a line through its center W alerts fire fighting personnel to the possible hazard in use of water. This bottom space may be also used to identify a radiation hazard by the symbol ☢. Oxidizing chemicals are identified in the bottom space by OXY.

To supplement the spatial arrangement, NFPA No. 704M recommends the use of colored backgrounds or colored numbers to identify the hazard categories—blue for "health," red for "flammability," yellow for "reactivity."

For a detailed description of the hazard identification system used here, see "Recommended System for the Identification of the Fire Hazards of Materials, NFPA No. 704M, 1969 Edition."

The following paragraphs summarize the meanings of the numbers in each hazard category and explain what a number should tell fire fighting personnel about protecting themselves and how to fight fires where the hazard exists.

Health

4 A few whiffs of the gas or vapor could cause death; or the gas, vapor, or liquid could be fatal on penetrating the fire fighters' normal full protective clothing which is designed for resistance to heat. For most chemicals having a Health 4 rating, the normal full protective clothing available to the average fire department will not provide adequate protection against skin contact with these materials. Only special protective clothing designed to protect against the specific hazard should be worn.

3 Materials extremely hazardous to health, but areas may be entered with extreme care. *Full protective clothing, including self-contained* breathing apparatus, rubber gloves, boots and bands around legs, arms and waist should be provided. No skin surface should be exposed.

2 Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus.

1 Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus.

0 Materials which on exposure under fire conditions would offer no health hazard beyond that of ordinary combustible material.

Flammability

4 Very flammable gases, very volatile flammable liquids, and materials that in the form of dusts or mists readily form explosive mixtures when dispersed in air. Shut off flow of gas or liquid and keep cooling water streams on exposed tanks or containers. Use water spray carefully in the vicinity of dusts so as not to create dust clouds.

3 Liquids which can be ignited under almost all normal temperature conditions. Water may be ineffective on these liquids because of their low flash points. Solids which form coarse dusts, solids in shredded or fibrous form that create flash fires, solids that burn rapidly, usually because they contain their own oxygen, and any material that ignites spontaneously at normal temperatures in air.

2 Liquids which must be moderately heated before ignition will occur and solids that readily give off flammable vapors. Water spray may be used to extinguish the fire because the material can be cooled to below its flash point.

1 Materials that must be preheated before ignition can occur. Water may cause frothing of liquids with this flammability rating number if it gets below the surface of the liquid and turns to steam. However, water spray gently applied to the surface will cause a frothing which will extinguish the fire. Most combustible solids have a flammability rating of 1.

0 Materials that will not burn.

Reactivity

4 Materials which in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. Includes materials which are sensitive to mechanical or localized thermal shock. If a chemical with this hazard rating is in an advanced or massive fire, the area should be evacuated.

3 Materials which in themselves are capable of detonation or of explosive decomposition or of explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. Includes materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures or which react explosively with water without requiring heat or confinement. Fire fighting should be done from an explosion-resistant location.

2 Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures or which can undergo violent chemical change at elevated temperatures and pressures. Also includes those materials which may ract violently with water or which may form potentially explosive mixtures with water or generates toxic gases, vapors or fumes when mixed with water. In advanced or massive fires, fire fighting should be done from a protected location.

1 Materials which in themselves are normally stable but which may become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently. Caution must be used in approaching the fire and applying water.

0 Materials which are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used.

DATE: 05/23/84 CHEMICAL WASTE MANAGEMENT, INC PROFILE #: 027294
WASTE PROFILE SUMMARY SALES OFF: MAR

GENERATOR: LOCKHEED GA
ADDL LINE:
ADDRESS : S COBB DR
CITY/ST : MARIETTA GA 30063
CONTACT : A.L. REDDOCH
PHONE NBR: 404/424-3577

NUMBER :6955013793
APPROVE :07/12/83
EXPIRATION:07/12/84
LAST LOAD :03/30/84
STATUS :ACTIVE WASTE STREAM

WASTE NAME: 81-6 (00979) D/72-58

PHYSICAL STATE: LIQUID
FLASH POINT 035
PH LEVEL : 4.0
% TAXABLE : 100
TREATMENT CODES: NTC
EPA WASTE CODE: F002 F005 D001

ANALYTICAL NOTES

AIRCRAFT PAINTING & CLEANING

MEK 70-80%; TCE 10-20%;

BTU 15,750; CL 5.9%;

INSOLUBLE W/H20.

ASH CONTENT 0.33%.

USEPA ID NO :
CWM WASTE CODE: 202
EPA PERMIT NO :
EPA EXPIRATION: / /

ANALYT.	GENERAL	MIXES
	CHECKS	TH. FILM
	PCB ANYL	ANYL. 2
PRECAUT.	HANDLING	REACTION
	COMPAT.	SUPERVI.
	INCINER.	PREC. 1
PROTECT.	GLOVES	EYEWEAR
	FOOTWEAR	CLOTHING
	RESPERAT	PROT. 1
EQUIP.	VEHICLES	EQP. 1
	EQP. 2	EQP. 3
	EQP. 4	EQP. 5

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 06214 Date Received Aug. 31, 1984

Waste Name/Generating Process: Group B - Paint and Thinners

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State ($70^{o}F$): Solid X Semi-Solid ____ Liquid ____

Powder ____ Other ____

Color: Yellowish Brown Odor: Solvent

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point 47 ^{o}F

CORROSIVITY (Ref. 40 CFR 261.22)

pH 6.7

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23) * Sulfur by Bomb Calorimeter

Total cyanide 0.4 mg/l %

Free cyanide ____ %

Total ~~sulfide~~ sulfur 0.017 %

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag	0.476	Cr	2810
As	2.5	Hg	0.0003
Ba	9.0	Pb	1060
Cd	49.8	Se	29.0

OTHERS (Ref 40 CFR 261.30)

* GC/MS - Qualitative only
GC - Capillary Column, FID

Organic Constituents (as % ~~or ppm~~)

Item	Conc
Methylene Chloride	17.3%
MEK	7.0%
111 Trichloroethane	45.9%
N. Butonol	0.82%
Heptane	0.007%
Dioxane	1.23%
Cellosolve Acetate	0.36%
Butyl Cellosolve	0.43%
Water	0.8%
Acetone	0.48%
MIB Ketone	0.30
Toluene	1.66%
N Butyl Acetate	0.007%
Xylene	0.64%
Ethanol	0.27%
Isobuthanol	0.02%
Ethyl Benzene	0.14%

ANALYST: [illegible] DATE:

APPROVED: [illegible] DATE: 10/30/84

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: TRICHLOROETHYLENE (TCE)

CHARACTERISTICS: ~99% TCE

(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM DRAINING VAPOR DEGREASERS.
DRUM STORAGE FOR OFFSITE RECYCLE BY ARIVEC,
OR DISPOSAL BY CHEM WASTE.

GENERATION
1. RATE: 945 GAL (1985 1ST 6 MO DISPOSAL)
2,475 GAL (1984)(RECYCLE)
2. FREQUENCY:
3. COST: $370 (1984 REVENUE)
$5900 (PROJ 1985 COSTS)

PROPOSED CHANGES: INVESTIGATING CHANGEOVER TO
1,1,1-TRICHLOROETHANE

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY: 924 GAL (DRUMS) + 80,000 GAL (BULK)
3. COST: $315,500

NOTES: DRUMS ANALYZED @ $200/each

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: SPENT SALT BATHS

CHARACTERISTICS: SODIUM NITRATE, POTASSIUM NITRATE, SODIUM DICHROMATE (KOLENE) MIXED WITH SODIUM HYDROXIDE, SODIUM CARBONATE & SODIUM NITRATE (MF-24 & MF-81)
(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM 2 SYSTEMS: KOLENE @ 18-07 FOR HEAT TREAT OF ALUMINUM; MF-24 & MF-81 @ 18-09 ~~AND~~ FOR PAINT STRIPPING RACKS AND HOOKS.
SPENT SALT BATHS DRAINED INTO DRUMS FOR LANDFILL.

GENERATION
1. RATE: 6,490 GAL (1985 PROJ)
2. FREQUENCY:
3. COST: $6900/YEAR

PROPOSED CHANGES:

RAW MATERIAL DATA
1. CHARACTERISTICS: SP. GRAV. ≈ 2.0
2. QUANTITY:
3. COST:

NOTES:

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 06401 Date Received Sept 7, 1984

Waste Name/Generating Process: Group F - Heat-Treat Salt Bath

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State (70°F): Solid X Semi-Solid ____ Liquid ____

Powder ____ Other ____

Color: Yellow Odor: ____

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point ____ °F

CORROSIVITY (Ref. 40 CFR 261.22)

pH ____

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23)

Total cyanide ____ %

Free cyanide ____ %

Total sulfide ____ %

Other-$NaNO_3$ - 45-55% By Wt.
KNO_3- 45-55% By Wt.

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag	0.007	Cr	5.66
As	1.09	Hg	0.0004
Ba	0.011	Pb	0.059
Cd	0.002	Se	1.91

OTHERS (Ref 40 CFR 261.30)

Organic Constituents (as % or ppm)

Item	Conc
None Present	

ANALYST: [signature] DATE:

APPROVED: [signature] DATE: 10/30/84

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 06401 Date Received Sept. 7, 1984

Waste Name/Generating Process: Group G - Kolene Salt Bath

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State ($70^{o}F$): Solid X Semi-Solid ____ Liquid ____

Powder ____ Other ____

Color: Yellow Odor: ____

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point ____ ^{o}F

CORROSIVITY (Ref. 40 CFR 261.22)

pH ____

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23)

Total cyanide ____ %

Free cyanide ____ %

Total sulfide ____ %

Other- NaOH 40-50% by Wt.
$NaNO_3$ 40-50% by Wt.

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag	0.008	Cr	49.2
As	0.098	Hg	.0004
Ba	0.073	Pb	<0.001
Cd	0.006	Se	2.08

OTHERS (Ref 40 CFR 261.30)

Organic Constituents (as % or ppm)

Item	Conc
None Present	

ANALYST: [signature] DATE:

APPROVED: [signature] DATE: 10/30/84

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*** SECTION I - PRODUCT IDENTIFICATION ***

PRODUCT NAME: TEMPERING C
CHEMICAL NAME: HEAT TREAT SALT

MANUFACTURER: HEATBATH CORPORATION
EMERGENCY TELEPHONE NO.: (413) 543-3381

NSN: 0000000031065 08 NO.: 08-0858-920
EPS NO.: 631.065

COMMENT: 8/81

*** SECTION II - HAZARDOUS COMPONENTS ***

INGREDIENT	NIOSH	PCT	TLV

*** SECTION III - PHYSICAL DATA ***

APPEARANCE AND ODOR: Pink powder no odor.
BOILING POINT:
VAPOR PRESSURE:
VAPOR DENSITY:
SOLUBILITY IN WATER: Very solubl
SPECIFIC GRAVITY: 2.15
PERCENT VOLATILES: None
EVAPORATION RATE: None

*** SECTION IV - FIRE AND EXPLOSION RATE ***

FLASH POINT: N.A.
LOWER EXPLOSIVE LIMIT:
UPPER EXPLOSIVE LIMIT:
EXTINGUISHING MEDIA:
Molten - dry sand or sodium carbonate Dry - water

SPECIAL FIRE FIGHTING PROCEDURES:

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Do not heat over 1100 F

*** SECTION V - HEALTH HAZARD DATA ***

THRESHOLD LIMIT VALUE FOR MIXTURE: Not est.
EFFECTS OF OVEREXPLOSURE:
May be irritating to eyes or skin

EMERGENCY & FIRST AID PROCEDURES:
Skin - wash with soap and water. Eyes - Flush with plenty of water, call a physician.

*** SECTION VI - REACTIVITY DATA ***

STABILITY:	YES
CONDITIONS TO AVOID:	Temperatures above 1100 F
INCOMPATIBILITY:	Avoid organic materials when salt is molten.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxides of nitrogen when with organic matter and molten
HAZARDOUS POLYMERIZATION:	NO
CONDITIONS TO AVOID:	

*** SECTION VII - SPILL OR LEAK PROCEDURES ***

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Sweep up solid material. Cover molten material with dry sand.

WASTE DISPOSAL METHOD:
Place in approved dumping area.

*** SECTION VIII - SPECIAL PROTECTION INFORMATION ***

RESPIRATORY PROTECTION:
VENTILATION:
PROTECTIVE GLOVES: Heat resistant
EYE PROTECTION: Safety glasses
OTHER PROTECTIVE EQUIPMENT:

*** SECTION IX - SPECIAL PRECAUTIONS ***

HANDLING AND STORAGE PRECAUTIONS:
Dry and cool away from combustible materials.

OTHER PRECAUTIONS:
OSW

*** END OF RECORD ***

M.S.D.S.

*** SECTION I - PRODUCT IDENTIFICATION ***

PRODUCT NAME: KOLENE NO. 5
CHEMICAL NAME:

MANUFACTURER: KOLENE CORPORATION
EMERGENCY TELEPHONE NO.: (313) 273-9220

NSN: 0000000003213 08 NO.: 08-0872-399
EPS NO.: 632.13

COMMENT:

*** SECTION II - HAZARDOUS COMPONENTS ***

INGREDIENT	NIOSH	PCT	TLV
Sodium Hydroxide		60.0	
Sodium Nitrate		60.0	
Sodium Chloride		10.0	

*** SECTION III - PHYSICAL DATA ***

APPEARANCE AND ODOR: White granular odorless solid
BOILING POINT: 1200 F
VAPOR PRESSURE: 0
VAPOR DENSITY:
SOLUBILITY IN WATER: Complete
SPECIFIC GRAVITY: 2.0
PERCENT VOLATILES: 0
EVAPORATION RATE:

*** SECTION IV - FIRE AND EXPLOSION RATE ***

FLASH POINT: None
LOWER EXPLOSIVE LIMIT:
UPPER EXPLOSIVE LIMIT:
EXTINGUISHING MEDIA:
CO2, dry chemical in vicinity of molten salts.

SPECIAL FIRE FIGHTING PROCEDURES:
Avoid vaporizing liquids, water and acid in salt baths.

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Introduction of water, vaporizing liquids, magnesium or reducing agents into molten salt - explosion

*** SECTION V - HEALTH HAZARD DATA ***

THRESHOLD LIMIT VALUE FOR MIXTURE: 2 mg/M3
EFFECTS OF OVEREXPLOSURE:
Moderate to severe burns on skin and eyes.

EMERGENCY & FIRST AID PROCEDURES:
Skin - wash area with plenty of water. Eyes - flush with large amounts of water for 15 minutes, call a physician.

*** SECTION VI - REACTIVITY DATA ***

STABILITY:	YES
CONDITIONS TO AVOID:	Overheating above 1000 F
INCOMPATIBILITY:	Water, acids, reducing agents.
HAZARDOUS DECOMPOSITION PRODUCTS:	Above 1000 F nitrogen oxides.
HAZARDOUS POLYMERIZATION:	NO
CONDITIONS TO AVOID:	

*** SECTION VII - SPILL OR LEAK PROCEDURES ***

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Sweep or shovel solid material into metal containers. Avoid personal contact. Rinse or hose area well.

WASTE DISPOSAL METHOD:
Dissolve in cold water and neutralize with acid. Dispose of in accordance with regulations.

*** SECTION VIII - SPECIAL PROTECTION INFORMATION ***

RESPIRATORY PROTECTION: Dust mask when handling powder.
VENTILATION: Local exhaust recommended over salt bath.
PROTECTIVE GLOVES: Rubber
EYE PROTECTION: Face shield
OTHER PROTECTIVE EQUIPMENT: Heat proof gloves and appropriate apparel for molten salt.

*** SECTION IX - SPECIAL PRECAUTIONS ***

HANDLING AND STORAGE PRECAUTIONS:
Store in a dry area. Avoid contact of salt with acids. Keep drums closed when not in use. Avoid bodily contact.

OTHER PRECAUTIONS:

*** END OF RECORD ***

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*** SECTION I - PRODUCT IDENTIFICATION ***

PRODUCT NAME: DRAW TEMP 430
CHEMICAL NAME:

MANUFACTURER: E. F. HOUGHTON & COMPANY
EMERGENCY TELEPHONE NO.: (215) 666-4065

NSN: 8888888831065 08 NO.: 08-0858-920
EPS NO.: 631.065

COMMENT: 7/81

*** SECTION II - HAZARDOUS COMPONENTS ***

INGREDIENT	NIOSH	PCT	TLV
Sodium Nitrates			
Potassium Nitrates			

*** SECTION III - PHYSICAL DATA ***

APPEARANCE AND ODOR: White salt mixture, no odor
BOILING POINT:
VAPOR PRESSURE:
VAPOR DENSITY:
SOLUBILITY IN WATER: Complete
SPECIFIC GRAVITY:
PERCENT VOLATILES:
EVAPORATION RATE:

*** SECTION IV - FIRE AND EXPLOSION RATE ***

FLASH POINT: N.A.
LOWER EXPLOSIVE LIMIT:
UPPER EXPLOSIVE LIMIT:
EXTINGUISHING MEDIA:
Molten state - CO2, dry chemical, dry sand. NO WATER.

SPECIAL FIRE FIGHTING PROCEDURES:

UNUSUAL FIRE AND EXPLOSION HAZARDS:
Do not mix with cyanides, cyanates, reducing agents, organic or carbonaceous mater..ls.

*** SECTION V - HEALTH HAZARD DATA ***

THRESHOLD LIMIT VALUE FOR MIXTURE: Not est.
EFFECTS OF OVEREXPLOSURE:
May cause irritation to skin or eyes.

EMERGENCY & FIRST AID PROCEDURES:
Skin - wash with soap and water. Eyes - flush with plenty of water for at least 15 minutes.ORw

*** SECTION VI - REACTIVITY DATA ***

STABILITY: YES
CONDITIONS TO AVOID:
INCOMPATIBILITY: Cyanides, cyanates, reducing agents, organic materials.
HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of nitrogen
HAZARDOUS POLYMERIZATION: NO
CONDITIONS TO AVOID:

*** SECTION VII - SPILL OR LEAK PROCEDURES ***

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
Brush up and deposit in solution described below. Wash area with water.

WASTE DISPOSAL METHOD:
Treat with sulfamic acid.

*** SECTION VIII - SPECIAL PROTECTION INFORMATION ***

RESPIRATORY PROTECTION:
VENTILATION: Local exhaust recommended
PROTECTIVE GLOVES: Heat resistant
EYE PROTECTION: Face shield
OTHER PROTECTIVE EQUIPMENT:

*** SECTION IX - SPECIAL PRECAUTIONS ***

HANDLING AND STORAGE PRECAUTIONS:
Store in cool dry isolated area away from areas of acute fire hazard and organic and easily oxidized materials.

OTHER PRECAUTIONS:
Do not exceed working range temperature. Use clean pots. Avoid moisture contamination.

*** END OF RECORD ***

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: IWT SLUDGE

CHARACTERISTICS: 15-20% SOLIDS, 8-16% OILS, CADMIUM & CHROMIUM, 10-25% FeO_2, 4-12% SiO_2
8.5-10 lb/gal

(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT:

GENERATION
1. RATE: 192,000 GAL
2. FREQUENCY:
3. COST:

PROPOSED CHANGES: PROPOSED FILTER PRESS SHOULD INCREASE SOLIDS CONTENT TO ~40%

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY:
3. COST:

NOTES:

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 07063 Date Received Sept. 29, 1984

Waste Name/Generating Process: Group E - Industrial Waste Treatment Sludge

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State ($70^{o}F$): Solid ____ Semi-Solid X Liquid ____

Powder ____ Other ____

Color: Brown Odor: mild

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point No Flash ^{o}F

CORROSIVITY (Ref. 40 CFR 261.22)

pH 7

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23) * Sulfur by Bomb Calorimeter

Total cyanide 6.25 mg/l %

Free cyanide ____ %

Total ~~sulfide~~ sulfur 0.072 %

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag	0.001	Cr	24.8
As	0.556	Hg	0.0003
Ba	0.625	Pb	0.003
Cd	9.0	Se	0.152

OTHERS (Ref 40 CFR 261.30) * GC/MS - Qualitative only
GC- Capillary Column, FID

Organic Constituents (as % ~~or ppm~~)

Item	Conc
Acetone	0.06%
Perchloroethylene	0.002%
Mesitylene	0.04%
Undecane	0.03%
Dodecane	0.03%
Water	79.8%
Non-Volatiles	20.2%

ANALYST: [illegible] DATE:

APPROVED: [illegible] DATE: 12/30/84

THIS FORM HAS BEEN DEVELOPED BY AND FOR THE USE OF CHEMICAL WASTE MANAGEMENT, INC. AND OTHER WASTE MANAGEMENT, INC. COMPANIES.

8505

SALES	CODE
MAR	A 57481

WASTE PROFILE SHEET CODE

GENERATOR'S WASTE MATERIAL PROFILE SHEET

GENERAL DIRECTIONS: In order for us to determine whether we can lawfully, safely and environmentally transport, store, treat or dispose of your waste stream, we must ask certain information about your waste. All of the information we seek is necessary, for our purposes and yours. Be complete in your answers: if your response is "none," so indicate. Answers must be in ink or typewritten. Information you provide will be maintained in strictest confidence. Please make a copy of this form for your records, returning the original to the location indicated below.

THIS FORM AND ANY SUPPLEMENTAL INFORMATION SHOULD BE RETURNED TO:

CHEMICAL WASTE MANAGEMENT, INC.
TECHNICAL CENTER
150 W. 137th STREET
RIVERDALE, ILLINOIS 60627

RECEIVED
SEP 16 1983
~~CWM/MAR~~

1. GENERATOR NAME: Lockheed-Georgia JIM CASHEN
2. GENERATING FACILITY NAME/ADDRESS/USEPA FACILITY I.D. NUMBER (IF ANY):
3. COMPANY CONTACTS:

GENERAL	Jay Arnold	TITLE	Dir. of Safety	PHONE	(404) 424-3760
		TITLE		PHONE	
TECHNICAL	A. L. Reddoch	TITLE	Supervisor-IWT	PHONE	(404) 424-3577
		TITLE		PHONE	

4. WASTE NAME: Industrial Waste Sludge #02738
5. PROCESS GENERATING WASTE: Industrial Waste Water Treatment
6. WASTE CHARACTERISTICS:
   - A. PHASES/LAYERS: BILAYERED ☐ MULTILAYERED ☐ NONE ■
   - B. PHYSICAL STATE AT 70°F: SOLID ☐ SEMI-SOLID ☒ LIQUID ☐ POWDER ☐ OTHER: ______
   - C. SOLIDS: TOTAL (%): 24 - 32 TOTAL DISSOLVED (ppm or %): Unknown - Not Determinable
   - D. SPECIFIC WEIGHT (AS # PER UNIT): 8.5 - 10# per gallon
   - E. pH: 8 - 9 (Show the following as range of %)

AS:					
H_2SO_4	None -	%	H_3PO_4	None -	%
HC1	None -	%	NaOH	None -	%
HF	None -	%	NH_4OH	None -	%
HNO_3	None -	%	$Ca(OH)_2$	None -	%
OTHER: SiO_2	4 - 12	%	Fe_2O_3	10 - 25	%
	-	%		-	%

   - F. FLASH POINT: Over 400°F °F (CLOSED CUP TEST ONLY)
   - G. VAPOR PRESSURE (in mm of Hg at 25°C): 16
   - H. BTU PER #: 1500 - 2500 ASH CONTENT: 12 - 20 %
   - I. CHARACTERISTIC COLOR: Brown DISTINCTIVE ODOR: Mild Petroleum Aroma
   - J. HALOGENATED? No % SULFONATED? No %
   - K. ALPHA RADIATION AS pCi/l: None Detected

FORM WM 50-A Rev 11-5-80

COMPOSITION:

ORGANIC COMPONENTS (WITH RANGES — INDICATE WHETHER % OR ppm)

Mixed Petroleum	8 _ 16 %		_
Residues (Oils)	_		_
	_		_
	_		_

(ATTACH ADDITIONAL PAGES IF NECESSARY)

DOES THIS WASTE CONTAIN ENDRIN, LINDANE, METHOXYCHLOR, TOXAPHENE, 2,4-D, 2,4,5-TP SILVEX, OR ANY OTHER ORGANIC COMPOUNDS LISTED BY USEPA AT 40 CFR 261.24? No IF SO, PLEASE NOTE ABOVE.

B. HEAVY METALS (WITH ppm RANGES):

	TOTAL	TOTAL LEACHABLE		TOTAL	TOTAL LEACHABLE
Ag	None Detected		Hg		
As	None Detected		Ni		
Ba	None Detected		Pb		
Cd	350-500 ppm	350-500 ppm	Se		
Cr	3000-4500ppm	1500-2500 ppm	Zn	20 - 60 ppm	20 - 60 ppm
Cu			Other (ATTACH ADDITIONAL PAGES)		

(IF YOU HAVE DETERMINED TOTAL LEACHABLES USING USEPA'S "EP TOXICITY TEST PROCEDURE" — AT 40 CFR, PART 261, APPENDIX II — SO INDICATE BY MARKING "EP" AFTER THE RESULT SHOWN ABOVE.)

C. INORGANIC COMPONENTS (WITH % RANGES):

		OTHER	
TOTAL CYANIDE	.02 — .04 %	Iron Oxide	10 _ 25 %
FREE CYANIDE	— None %	Silicon Dioxide	4 _ 12 %
SULFIDE AS:	— None %		— %
BISULFITE AS:	— None %		— %
SULFITE AS:	— None %		— %

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. DOES THIS WASTE STREAM CONTAIN BIOLOGIC MATERIALS, PATHOGENS, OR ETIOLOGICAL AGENTS? No IF SO, ATTACH ADDITIONAL PAGES DESCRIBING SUCH MATERIALS.

E. IS THE WASTE A PESTICIDE OR PRODUCED BY A PESTICIDE MANUFACTURING PROCESS? No
IF SO, INDICATE WHETHER IT CONTAINS:

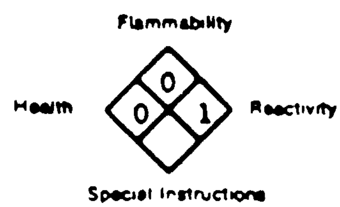
- ☐ ORGANOPHOSPHATES — CONTAINING SULFUR ☐ YES ☒ NO
- ☐ CARBAMATES
- ☐ CHLORINATED HYDROCARBONS

8. HAZARDOUS COMPONENTS AND CHARACTERISTICS

A. HAZARDOUS PROPERTIES (INSERT NUMBER CODES PER INSTRUCTIONS ON LAST PAGE)

(1) TOXICITY RATING: INHALATION ____ DERMAL ____ ORAL ____

(2) HAZARD IDENTIFICATION SYSTEM:



B. LIST ANY OTHER ACUTE OR CHRONIC HAZARDS ASSOCIATED WITH OR ALLEGED TO BE ASSOCIATED WITH HUMAN CONTACT WITH OR EXPOSURE TO THE WASTE: None Known

ULATORY CLASSIFICATION OF WASTE

IS THIS WASTE A "HAZARDOUS MATERIAL" AS DEFINED BY REGULATIONS OF THE U.S. DEPARTMENT OF TRANSPORTATION PURSUANT TO THE HAZARDOUS MATERIALS TRANSPORTATION ACT? ______ (SEE 49 CFR 172.101 AND 173 FOR "HAZARDOUS MATERIALS" LIST AND CHARACTERISTICS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) CORRECT SHIPPING DESCRIPTION: Sludge containing petroleum residue

(2) HAZARD CLASS(ES): None

(3) MATERIAL I.D. NO.(S) Unknown

B. DOES THIS WASTE CONTAIN ANY "HAZARDOUS SUBSTANCE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT? ______ (SEE 40 CFR 117 FOR "HAZARDOUS SUBSTANCES" AND CATEGORIES.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) THE NAMES OF EACH HAZARDOUS SUBSTANCE PRESENT IN THE WASTE, THE HAZARD CATEGORY (X, A, B, C OR D) AND THE APPROXIMATE CONCENTRATION OF THE SUBSTANCE BY WEIGHT IN THE WASTE:

Oil residues (Category X)

(ATTACH ADDITIONAL PAGES IF NECESSARY)

C. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 3001 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? Yes (SEE 40 CFR, PART 261 FOR WHAT IS A "HAZARDOUS WASTE.") IF SO, STATE:

(1) THE USEPA HAZARDOUS WASTE NUMBER(S): D006 and D007

(2) DO YOU CLAIM TO BE A SMALL QUANTITY GENERATOR? No (SEE 40 CFR 261.5.)

D. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY THE ENVIRONMENTAL REGULATORY AGENCY IN YOUR STATE? Yes IF SO, STATE WHY IT IS SO DEFINED AND ANY STATE HAZARDOUS WASTE CODE NUMBERS ASSIGNED D006 and D007

10. IS THE INFORMATION PROVIDED IN SECTIONS 6-9 BASED UPON LABORATORY ANALYSIS OF THE WASTE MATERIAL? Yes IF SO, PLEASE ADVISE OF THE DATE OF THE MOST RECENT ANALYSIS. 6/29/83

11. HAVE YOU OBTAINED TOXICITY STUDIES OF THIS WASTE STREAM? ______ IF SO, PLEASE ATTACH A COPY OF THE RESULTS.

12. QUANTITY/SHIPPING REQUIREMENTS:

ANTICIPATED VOLUME IS: 3500

GALLONS ☐ TONS ☒ CUBIC YARDS ☐ DRUMS ☐ OTHER ☐ ______

PER: DAY ☐ WEEK ☐ MONTH ☐ YEAR ☒ ONE TIME ☐

TRANSPORTATION EQUIPMENT REQUIRED: Sludge Hopper

SERVICE/SCHEDULING REQUIREMENTS: On Call

GENERATOR'S AUTHORIZED SIGNATORY: R R Reddoch TITLE Supervisor IWT DATE 7/20/83

CONFIDENTIALITY AGREEMENT: Chemical Waste Management, Inc

as consideration for the Generator's release of the above information, and any other supplemental data provided, agrees to treat such information as confidential property and will not disclose such information to others except as is required by law, and in such circumstances only after first giving notice to the Generator.

By John R Hughes
Name
Tech. Rep.
Title

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: SEALANT WASTES

CHARACTERISTICS: TWO TYPES; CATALYTIC SEALANT IS PETROLEUM BASED W/CR; BASE SEALANT IS NAPTHA BASED W/CHROMIUM -- WASTE INCLUDE: CANS, APPLICATORS, ETC.
(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FROM AIRCRAFT FUEL TANK SEALING
SEALANT HAS SHORT POT LIFE & MUST BE DISCARDED IF NOT USED W/N HOURS OF FORMULATION
ACCUMULATED IN DRUMS FOR LANDFILL BY CWM

GENERATION
1. RATE: 7,700 GAL (1984)
2. FREQUENCY: DAILY
3. COST:

PROPOSED CHANGES: PROJECTED 1985 RATE IS 19,360 GAL

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY:
3. COST:

NOTES:

SALES	CODE
MAR	№ 27752

Chemical Waste Management

GENERATOR'S WASTE MATERIAL PROFILE SHEET

GENERAL DIRECTIONS: In order for us to determine whether we can lawfully, safely and environmentally transport, store, treat or dispose of your waste stream, we must ask certain information about your waste. All of the information we seek is necessary, for our purposes and yours. Be complete in your answers: if your response is "none," so indicate. Answers must be in ink or typewritten. Information you provide will be maintained in strictest confidence. Please make a copy of this form for your records, returning the original to the location indicated below.

THIS FORM AND ANY SUPPLEMENTAL INFORMATION SHOULD BE RETURNED TO:

~~CHEMICAL WASTE MANAGEMENT, INC.~~
~~2131 KINGSTON COURT, S.E.~~
SUITE 112
~~MARIETTA, GEORGIA 30067~~

SEND SAMPLES DIRECT TO:
CHEMICAL WASTE MANAGEMENT
P. O. BOX 55/HWY. 17, MILE MARKER 163
EMELLE, ALABAMA 35459
ATTN: CHIEF CHEMIST

1. GENERATOR NAME: Lockheed-Georgia Company
2. GENERATING FACILITY NAME/ADDRESS: Lockheed-Georgia Company, Marietta, Georgia 30063
3. COMPANY CONTACTS:

	Name	TITLE	PHONE
GENERAL	C. F. Griffin	Pollution Coordinator	(404) 424-3114
TECHNICAL	A. L. Reddoch	Supervisor - IWT	(404) 424-3577

4. WASTE NAME: Aircraft Sealants
5. PROCESS GENERATING WASTE: Wing Sealing

WASTE PROPERTIES:

A. ORGANIC ☐ INORGANIC ☐ HAS BOTH ORGANIC AND INORGANIC COMPONENTS ☐

B. PHASES/LAYERS: BILAYERED ☐ MULTILAYERED ☐ NONE ☒

C. PHYSICAL STATE AT 70°F: SOLID ☐ SEMI-SOLID ☒ LIQUID ☐ POWDER ☐ OTHER: ______

D. SOLIDS: TOTAL (%): 94-99% TOTAL DISSOLVED (ppm or %): 94-99%

E. SPECIFIC WEIGHT (AS # PER UNIT): 10.5 - 12.0

F. pH: N/A (Show the following as range of %)

AS:				
H_2SO_4	0 - 0 %		H_3PO_4	0 - 0 %
HC1	0 - 0 %		NaOH	0 - 0 %
HF	0 - 0 %		NH_4OH	0 - 0 %
HNO_3	0 - 0 %		$Ca(OH)_2$	0 - 0 %
OTHER:	- %			- %
	- %			- %

G. FLASH POINT: 105 - 130 °F CLOSED CUP ☒ OPEN CUP ☐

H. VAPOR PRESSURE (In mm of Hg at 25°C): 6.5 - 8.0

I. BTU PER #: 3000 - 4500 ASH CONTENT 22 - 35% %

J. HALOGENATED? ______ % SULFONATED? ______ %

K. ALPHA RADIATION AS pCi/l: ______

6. WASTE COMPOSITION:

A. ORGANIC COMPONENTS (WITH RANGES — INDICATE WHETHER % OR ppm)

Naphtha-Type Solvent	1 - 6%		-
Alkyd Resin	30 - 60%		-
Polysiloxane	2 - 30%		-
Mineral Oil	10 - 20%		-

(ATTACH ADDITIONAL PAGES IF NECESSARY)

B. HEAVY METALS (WITH ppm RANGES):

	DISSOLVED	SUSPENDED		DISSOLVED	SUSPENDED
Ag	None		Hg	None	
As	None		Ni	None	
Ba	None		Pb	None	
Cd	None		Se	None	
Cr	1 - 2%		Zn		
Cu	None		Other (specify)		

C. INORGANIC COMPONENTS (WITH % RANGES): OTHER

TOTAL CYANIDE	None - %	Titanium Oxide	1 - 20 %
FREE CYANIDE	None - %	Calcium Oxide	10 - 40 %
SULFIDE AS:	None - %	Manganese	.1 - .5 %
BISULFITE AS:	None - %	Magnesium	.1 - 2 %
SULFITE AS:	None - %		- %

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. DOES THIS WASTE STREAM CONTAIN BIOLOGIC MATERIALS, PATHOGENS, OR ETIOLOGICAL AGENTS? ____

E. IF WASTE IS A PESTICIDE OR PRODUCED BY A PESTICIDE MANUFACTURING PROCESS, CHECK THE FOLLOWING:

THE WASTE CONTAINS:

☐ ORGANOPHOSPHATES — CONTAINING SULFUR ☐ YES ☒ NO

☐ CARBAMATES

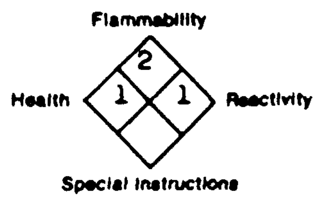
☐ CHLORINATED HYDROCARBONS

7. HAZARDOUS COMPONENTS AND CHARACTERISTICS

A. HAZARDOUS PROPERTIES (INSERT NUMBER CODES PER INSTRUCTIONS ON LAST PAGE)

(1) TOXICITY RATING: INHALATION 2 DERMAL 1 ORAL 3

(2) HAZARD IDENTIFICATION SYSTEM:



B. IS THIS WASTE A "HAZARDOUS MATERIAL" AS DEFINED BY REGULATIONS OF THE U.S. DEPARTMENT OF TRANSPORTATION PURSUANT TO THE HAZARDOUS MATERIALS TRANSPORTATION ACT? ______ (SEE 49 CFR 172.101 AND 173 FOR "HAZARDOUS MATERIALS" LIST AND CHARACTERISTICS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) CORRECT SHIPPING DESCRIPTION: Metallo Naphtha-Resin, Silicone Mixture

(2) HAZARD CLASS(ES): Flammable, Toxic (Ingestion)

(3) IDENTIFICATION NUMBER (FROM HAZARDOUS MATERIALS LIST): CAS 8030-30-6 UN1255

C. DOES THIS WASTE CONTAIN ANY "HAZARDOUS SUBSTANCE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 311 OF THE CLEAN WATER ACT?______ (SEE 40 CFR 116 FOR "HAZARDOUS SUBSTANCES" AND CATEGORIES.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) THE NAMES OF EACH HAZARDOUS SUBSTANCE PRESENT IN THE WASTE (INDICATING HAZARD CATEGORY — A, B, C, D, X):
X - Naphtha Derivative

(ATTACH ADDITIONAL PAGES IF NECESSARY)

(2) THE NAMES OF EACH SUCH SUBSTANCE WHICH MAY BE PRESENT IN CONCENTRATIONS GREATER THAN 10% BY WEIGHT (SHOWING PROBABLE % RANGE): Alkyd Resin (30 - 60%), Dimethyl Polysiloxane (2-30%), Mineral Oil (10 - 20%), Titanium Oxide (1 - 20%), Calcium Oxide (10 - 40%)

(ATTACH ADDITIONAL PAGES IF NECESSARY)

D. IS THIS WASTE A "HAZARDOUS WASTE" AS DEFINED BY REGULATIONS OF THE U.S. ENVIRONMENTAL PROTECTION AGENCY PURSUANT TO SECTION 3001 OF THE RESOURCE CONSERVATION AND RECOVERY ACT? Yes
(THIS PART NEED NOT BE COMPLETED UNTIL PROMULGATION OF FINAL 3001 REGULATIONS.) IF SO, PLEASE ADVISE OF THE FOLLOWING:

(1) IF THE WASTE IS A LISTED HAZARDOUS WASTE, STATE:

(a) THE LISTED DESCRIPTION OF THE WASTE: Alkyd Resin, Silicone, Mineral Oil, Naphtha Solvent Blend and Inorganic Salts

(b) THE HAZARD CRITERIA FOR WHICH THE WASTE IS LISTED:
Flammability

(2) IF THE WASTE IS NOT LISTED, WHAT HAZARDOUS CHARACTERISTIC(S) DOES IT POSSESS?

8. IS THE INFORMATION PROVIDED IN SECTIONS 5-7 BASED UPON LABORATORY ANALYSIS OF THE WASTE MATERIAL? Yes . IF SO, PLEASE ADVISE OF THE DATE OF THE MOST RECENT ANALYSIS: Feb. 10, 1982

9. HAVE YOU OBTAINED TOXICITY STUDIES OF THIS WASTE STREAM? No IF SO, PLEASE ATTACH A COPY OF THE RESULTS.

10. QUANTITY/SHIPPING REQUIREMENTS:

ANTICIPATED VOLUME IS: 100

GALLONS ☐ TONS ☐ CUBIC YARDS ☐ DRUMS ☒ OTHER ☐

PER: DAY ☐ WEEK ☐ MONTH ☐ YEAR ☒ ONE TIME ☐

TRANSPORTATION EQUIPMENT REQUIRED: On Call

SERVICE/SCHEDULING REQUIREMENTS:

GENERATOR'S AUTHORIZED SIGNATORY: C. T. Griffin TITLE______ DATE 4/7/82

CONFIDENTIALITY AGREEMENT: Chemical Waste Management, Inc. as consideration for the Generator's release of the above information, and any other supplemental data provided, agrees to treat such information as confidential property and will not disclose such information to others except as is required by law, and in such circumstances only after first giving notice to the Generator.

By: Ralph D. Rutherford
Name

Technical Representative
Title

TOXICITY RATINGS

0 = No Toxicity

This designation is given to materials which fall into one of the following categories:

(a) Materials which cause no harm under any conditions of normal use.

(b) Materials which produce toxic effects on humans only under the most unusual conditions or by overwhelming dosage.

1 = Slight Toxicity

(a) *Acute local.* Materials which on single exposures lasting seconds, minutes, or hours cause only slight effects on the skin or mucous membranes regardless of the extent of the exposure.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slight effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose, regardless of the quantity absorbed or the extent of exposure.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years cause only slight and usually reversible harm to the skin or mucous membranes. The extent of exposure may be great or small.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce only slightly usually reversible effects following continuous or repeated exposures extending over days, months, or years. The extent of the exposure may be great or small.

In general, those substances classified as having "slight toxicity" produce changes in the human body which are readily reversible and which will disappear following termination of exposure, either with or without medical treatment.

2 = Moderate Toxicity

(a) *Acute local.* Materials which on single exposure lasting seconds, minutes, or hours cause moderate effects on the skin or mucous membranes. These effects may be the result of intense exposure for a matter of seconds or moderate exposure for a matter of hours.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which produce moderate effects following single exposures lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years cause moderate harm to the skin or mucous membranes.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestim, or through the skin and which produce moderate effects following continuous or repeated exposures extending over periods of days, months, or years.

Those substances classified as having "moderate toxicity" may produce irreversible as well as reversible changes in the human body. These changes are not of such severity as to threaten life or produce serious physical impairment.

3 = Severe Toxicity

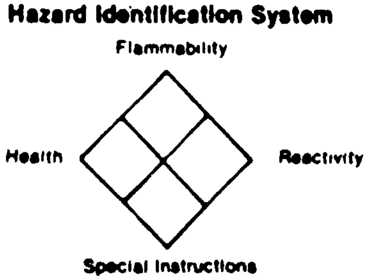
(a) *Acute local.* Materials which on single exposure lasting seconds or minutes cause injury to skin or mucous membranes of sufficient severity to threaten life or to cause permanent physical impairment or disfigurement.

(b) *Acute systemic.* Materials which can be absorbed into the body by inhalation, ingestion, or through the skin and which can cause injury of sufficient severity to threaten life following a single exposure lasting seconds, minutes, or hours, or following ingestion of a single dose.

(c) *Chronic local.* Materials which on continuous or repeated exposures extending over periods of days, months, or years can cause injury to skin or mucous membranes of sufficient severity to threaten life or cause permanent impairment, disfigurement, or irreversible change.

(d) *Chronic systemic.* Materials which can be absorbed into the body by inhalation, ingestion or through the skin and which can cause death or serious physical impairment following continuous or repeated exposures to small amounts extending over periods of days, months, or years.

Hazard Identification System



The above diagram identifies the "health," "flammability" and "reactivity" (instability and water reactivity) of a chemical and indicates the order of severity of each hazard by use of one of five numeral gradings, from four (4), indicating the severe hazard or extreme danger, to zero (0), indicating no *special* hazard. In the diamond-shaped diagram "health" hazard is identified at the left, "flammability" at the top, and "reactivity" at the right. The bottom space is primarily used to identify unusual reactivity with water. A W with a line through its center W alerts fire fighting personnel to the possible hazard in use of water. This bottom space may be also used to identify a radiation hazard by the symbol ☢ Oxidizing chemicals are identified in the bottom space by OXY.

To supplement the spatial arrangement, NFPA No. 704M recommends the use of colored backgrounds or colored numbers to identify the hazard categories—blue for "health," red for "flammability," yellow for "reactivity."

For a detailed description of the hazard identification system used here, see "Recommended System for the Identification of the Fire Hazards of Materials, NFPA No. 704M, 1969 Edition."

The following paragraphs summarize the meanings of the numbers in each hazard category and explain what a number should tell fire fighting personnel about protecting themselves and how to fight fires where the hazard exists.

Health

4 A few whiffs of the gas or vapor could cause death; or the gas, vapor, or liquid could be fatal on penetrating the fire fighters' normal full protective clothing which is designed for resistance to heat. For most chemicals having a Health 4 rating, the normal full protective clothing available to the average fire department will not provide adequate protection against skin contact with these materials. Only special protective clothing designed to protect against the specific hazard should be worn.

3 Materials extremely hazardous to health, but areas may be entered with extreme care. Full protective clothing, including self-contained breathing apparatus, rubber gloves, boots and bands around legs, arms and waist should be provided. No skin surface should be exposed.

2 Materials hazardous to health, but areas may be entered freely with self-contained breathing apparatus.

1 Materials only slightly hazardous to health. It may be desirable to wear self-contained breathing apparatus.

0 Materials which on exposure under fire conditions would offer no health hazard beyond that of ordinary combustible material.

Flammability

4 Very flammable gases, very volatile flammable liquids, and materials that in the form of dusts or mists readily form explosive mixtures when dispersed in air. Shut off flow of gas or liquid and keep cooling water streams on exposed tanks or containers. Use water spray carefully in the vicinity of dusts so as not to create dust clouds.

3 Liquids which can be ignited under almost all normal temperature conditions. Water may be ineffective on these liquids because of their low flash points. Solids which form coarse dusts, solids in shredded or fibrous form that create flash fires, solids that burn rapidly, usually because they contain their own oxygen, and any material that ignites spontaneously at normal temperatures in air.

2 Liquids which must be moderately heated before ignition will occur and solids that readily give off flammable vapors. Water spray may be used to extinguish the fire because the material can be cooled to below its flash point.

1 Materials that must be preheated before ignition can occur. Water may cause frothing of liquids with this flammability rating number if it gets below the surface of the liquid and turns to steam. However, water spray gently applied to the surface will cause a frothing which will extinguish the fire. Most combustible solids have a flammability rating of 1.

0 Materials that will not burn.

Reactivity

4 Materials which in themselves are readily capable of detonation or of explosive decomposition or explosive reaction at normal temperatures and pressures. Includes materials which are sensitive to mechanical or localized thermal shock. If a chemical with this hazard rating is in an advanced or massive fire, the area should be evacuated.

3 Materials which in themselves are capable of detonation or of explosive decomposition or of explosive reaction but which require a strong initiating source or which must be heated under confinement before initiation. Includes materials which are sensitive to thermal or mechanical shock at elevated temperatures and pressures or which react explosively with water without requiring heat or confinement. Fire fighting should be done from an explosion-resistant location.

2 Materials which in themselves are normally unstable and readily undergo violent chemical change but do not detonate. Includes materials which can undergo chemical change with rapid release of energy at normal temperatures and pressures or which can undergo violent chemical change at elevated temperatures and pressures. Also includes those materials which may ract violently with water or which may form potentially explosive mixtures with water generates toxic gases, vapors or fumes when mixed with water. In advanced or massive fires, fire fighting should be done from a protected location.

1 Materials which in themselves are normally stable but which may become unstable at elevated temperatures and pressures or which may react with water with some release of energy but not violently. Caution must be used in approaching the fire and applying water.

0 Materials which are normally stable even under fire exposure conditions and which are not reactive with water. Normal fire fighting procedures may be used.

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 06214 Date Received Aug 31, 1984

Waste Name/Generating Process: Group D - Aircraft Sealant Catalyst

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State (70°F): Solid ____ Semi-Solid X Liquid ____

Powder ____ Other ____

Color: Black Odor: Organic Sulfur

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point 125 °F

CORROSIVITY (Ref. 40 CFR 261.22)

pH N/A

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23) * Sulfur by Bomb Calorimeter

Total cyanide NONE %

Free cyanide ____ %

Total ~~sulfide~~ sulfur 0.59 %

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag.	0.009	Cr	971
As	0.170	Hg	0.0009
Ba	0.002	Pb	0.004
Cd	0.005	Se	0.233

OTHERS (Ref 40 CFR 261.30) * GC/MS - qualitative only
Volatile GC- Capillary Column, FID
Organic Constituents (as % ~~XXXXXX~~)

Item	Conc
Acetone	0.074%
Methyl Pyridine	1.3 %
Toluene	0.03%
Phenol	0.02%
Substituted Terphenyls	4.2%

ANALYST: [illegible signature] DATE:

APPROVED: [illegible signature] DATE: 10/30/84

HAZARDOUS WASTE LABORATORY REPORT

This report is formatted and designed by Lockheed-Georgia Company for the submittal of results obtained on hazardous wastes per 40 CFR 261 Subpart C - "Characteristics of Hazardous Waste", and Subpart D - "Lists of Hazardous Wastes".

Analysis Number: 06214 Date Received Aug. 31, 1984

Waste Name/Generating Process: Group C - Aircraft Sealant Base

Physical Description:

Phases/Layers: Bylayered ____ Multilayered ____ None X

Physical State ($70^{o}F$): Solid ____ Semi-Solid X Liquid ____

Powder ____ Other ____

Color: White Odor: Organic Sulfur

HAZARDOUS WASTE CHARACTERISTICS

IGNITABILITY (Ref. 40 CFR 261.21)

Flash Point 111 ^{o}F

CORROSIVITY (Ref. 40 CFR 261.22)

pH N/A

NACE corrosion Rate ____ mm/yr

REACTIVITY (Ref. 40 CFR 261.23) * Sulfur by Bomb Calorimeter

Total cyanide NONE %

Free cyanide ____ %

Total ~~sulfide~~ sulfur 25.7 %

EP TOXICITY (Ref. 40 CFR 261.24 and Appendix II)

Extractable Metals (in milligrams per liter)

Ag	0.033	Cr	0.006
As	0.023	Hg	0.0002
Ba	0.171	Pb	0.013
Cd	0.001	Se	0.055

OTHERS (Ref 40 CFR 261.30) *GC- Capillary Column, FID
* GC/MS Qualitative only

Violatile
Organic Constituents (as % ~~XXXXXX~~)

Item	Conc
Acetaldheyde	0.18%
CS_2	0.48%
Thiirane	0.56%
Toluene	14.8%
Thispropane	4.2%
Substituted Thiopropanes	1.16%
Substituted Thio Butanes	1.40%
Substituted Oxythiiranes	1.2%
Other Oxy. thio compounds, oil	10.0%

ANALYST: [illegible signature] DATE:

APPROVED: [illegible signature] DATE: 10/30/84

The Earth Technology Corporation

PLANT # 6
OPERATOR: LOCKHEED
DATE: 7-25-85

WASTE MINIMIZATION PROGRAM
DATA SHEET

WASTE STREAM: 2,4-DINITROPHENOL

CHARACTERISTICS: SEE ATTACHED MSDS

(ATTACH ANALYSIS IF AVAILABLE)

SOURCE/MANAGEMENT: FIRE FIGHTING FOAM DRAINED FROM SYSTEM DURING MAINTENANCE

IN 85-GAL OVERPACKS TO SCA - PINEWOOD, SC (SIX TOTAL)

GENERATION
1. RATE: 330 GAL (1984)
2. FREQUENCY: ONE TIME
3. COST: ~~$6400~~ ~~$665~~ $1265

PROPOSED CHANGES:

RAW MATERIAL DATA
1. CHARACTERISTICS:
2. QUANTITY:
3. COST:

NOTES:

MATERIAL SAFETY DATA SHEET

3M
3M Center
St. Paul, Minnesota 55144
(612) 733-1110

Form 15593-C PWO

DUNS NO.: 00-617-3082

Chemical Family: Fire Control Agent	Trade Name: FC-203A LIGHT WATER Brand Aqueous Film Forming Foam

3M I. D. Number: 98-0211-0198-9 (5 gallon unit) — Commercial Chemicals Division

1. INGREDIENTS

1. INGREDIENTS	CAS. #	%	TLV® (unit)
Butyl Carbitol	112-34-5	25	Not Established
Water	7732-18-5	65	
Fluoroalkyl Surfactants		<5	Not Established
Synthetic Detergents		<5	Not Established

2. PHYSICAL DATA

Boiling Point Initial	212°F	Solubility in Water	Miscible
Vapor Pressure		Specific Gravity (H_2O=1)	1.055
Vapor Density (Air = 1)		Percent Volatile	93
Evaporation Rate (B.A. =1)	<1	pH	7.5-8.5

Appearance and Odor: Clear, amber colored liquid.

3. FIRE AND EXPLOSION HAZARD DATA

Flash Point (Test Method) None	Flammable Limits: LEL = UEL =

Extinguishing Media: FC-203A is a fire extinguishing agent.

Special Fire Fighting Procedures

None .

Unusual Fire and Explosion Hazards: Toxic by-products including HF may be formed.

4. ENVIRONMENTAL INFORMATION

Spill Response

Collect spilled material. Wash residue to a wastewater treatment system.

Recommended Disposal

Bleed to a wastewater treatment system in accordance with local regulations. Keeping the concentration below 5 mg/l will eliminate foaming in activated sludge aeration basins.

Environmental Data

Chemical Oxygen Demand (COD) - 0.65 g/g
Biochemical Oxygen Demand (BOD_5) - 0.072 g/g, (BOD_{20}) - 0.43 g/g
96-Hr. LC_{50}, Fathead Minnow (*Pimephales promelas*)- 300 mg/l

Threshold Limit Values listed above are current to 1979. Because they are reviewed yearly by ACGIH and subject to change (usually to a lower value) it is necessary for the user of this Material Safety Data Sheet to maintain a list of revised TLV's and update the sheet periodically.

TRADE NAME: FC-203A LIGHT WATER Brand Aqueous Film Forming Foam

5. HEALTH HAZARD DATA

Eye Contact Undiluted FC-203A is mildly irritating upon direct eye contact. Persons having eye contact with FC-203A would be expected to experience slight transient irritation.

Skin Contact FC-203A was shown to be non-irritating to the skin of albino rabbits. The skin irritation potential to persons handling FC-203A should be very low. The dermal LD_{50} (rabbit) for butyl carbitol is 4 g/kg. Avoid prolonged or repeated skin contact.

Inhalation Inhalation studies on butyl carbitol indicate there is little hazard from acute exposure to high concentrations of the vapor. Prolonged or repeated inhalation of vapors should be restricted.

Ingestion The acute oral LD_{50} (rat) for FC-203A is greater than 5 g/kg. FC-203A is considered practically non-toxic orally.

Suggested First Aid

EYE CONTACT: Flush eyes with plenty of water. Call a physician.
SKIN CONTACT: Wash affected area with soap and water.
INHALATION: Remove person to fresh air.
INGESTION: Do not induce vomiting. Call a physician.

6. REACTIVITY DATA

STABILITY	☐ Unstable ☒ Stable	Conditions to Avoid
INCOMPATABILITY		Materials to Avoid
HAZARDOUS POLYMERIZATION	☐ May Occur ☒ May Not Occur	Conditions to Avoid

Hazardous Decomposition Products

Thermal decomposition may produce toxic materials including HF.

7. SPECIAL PROTECTION INFORMATION

Eye Protection	Skin Protection
Safety Glasses	Rubber Gloves desired.

Ventilation

General ventilation is adequate.

Respiratory and Special Protection

None Required

Other Protection

8. PRECAUTIONARY INFORMATION

Avoid eye contact. Avoid prolonged or repeated skin contact. Store between 35°F to 120°F.

9. DEPARTMENT OF TRANSPORTATION

Proper Shipping Name	DOT Hazard Class
Not Applicable	Not Applicable

Issue Date	Supersedes
Sept. 1980	3/77R

APPENDIX C

TITLE: Coolant Recycle	PROJECT NO.: PROJECT NAME: AFP 6	PAGE 1 OF 9

Design Basis

1. Current coolant use = 249,150 gpy
2. Switch to Trimsol will reduce generation by 60% to 99,660 gpy
3. ALMCO unit will reduce generation by 22,765 gpy to 76,895 gpy.
4. Coolant is 20:1 Trimsol; waste contains 3,845 gpy Trimsol.
5. If avg. coolant life is 4 months, sump vol. total is ~25,000 gal.
6. For treating all coolants once/month system design flows will be:
   - 300,000 gpy
   - 1,150 gpd
   - 48 gph
   - 0.8 gpm
7. Assume lose 8% of Trimsol each month through recycling.
   Total losses = 3800 gpy Trimsol
   All water remains
8. Avoided treatment cost @ $0.10/gal
   76,900 x .1 = $7,690/year

BY: DATE:	CHECKED BY: DATE:	The Earth Technology Corporation

TITLE: COOLANT RECYCLE	PROJECT NO.: PROJECT NAME: AFP 6	PAGE 2 OF 9

PLATE FILTRATION (MOBILE SYSTEM)

1. ADD BIOCIDE MONTHLY DURING RECYCLE STEP. ASSUME 0.25% OF COOLANT AS MAKE-UP RATE DURING EACH RECYCLE.

   USAGE: 300,000 x 0.0025 = 75 gpy
   COST: 75 x $53/gal = $3975/year

2. COOLANT MAKEUP REMAINS UNCHANGED FROM "NO RECYCLE" SCENARIO.

3. ASSUME OPERATING LABOR EQUALS PRESENT REQUIREMENTS FOR SYSTEM FLUSHING AND COOLANT REPLACEMENT.

4. NET SAVINGS:

AVOIDED TREATMENT	$7,690
BIOCIDE	-3,975
	$3,715/year

5. CAPITAL COST:

   ONE MOBILE PLATE FILTRATION SYSTEM
   TURBO FRAM 6280-8011
   $10,000/each

6. PAYBACK

$$\frac{10,000}{3715} = 2.7 \text{ years}$$

BY: DATE:	CHECKED BY: DATE:	The Earth Technology Corporation

D-6-1 7-84

TITLE: COOLANT RECYCLE	PROJECT NO.: PROJECT NAME: AFP 6	PAGE 3 OF 4

CENTRIFUGATION (BATCH W/CENTRAL COLLECTION)

1. ADD BIOCIDE AT SAME RATE AS FOR PLATE FILTRATION: $3,975/year

2. COOLANT MAKEUP UNCHANGED FROM "NO RECYCLE" SCENARIO.

3. ASSUME OPERATING LABOR EQUALS CURRENT SYSTEM FLUSHING & COOLANT REPLACEMENT

4. NET SAVINGS EQUAL THOSE FOR PLATE FILTRATION ; $3,715 /year

5. CAPITAL COST:

• CENTRIFUGE SYSTEM	$40,000
• STORAGE – TWO TANKS 5,000 GAL EACH	20,000
• INSTALATION	5,000
	$65,000

6. PAYBACK

$$\frac{65,000}{3,715} = 17.5 \text{ years}$$

BY: DATE:	CHECKED BY: DATE:	The Earth Technology Corporation

TITLE: COOLANT RECYCLE	PROJECT NO.: PROJECT NAME: AFP 6	PAGE 4 OF 4

CENTRIFUGATION (BATCH W/CENTRAL COLLECTION AND FLASH PASTURIZATION)

1. COSTS IDENTICAL TO THOSE FOR CENTRIFUGATION EXCEPT NO BIOCIDE REQUIRED.

2. COST SAVINGS = $7690/year

3. CAPITAL COSTS - SAME AS CENTRIFUGE

4. PAYBACK

$$\frac{65,000}{7,690} = 8.4 \text{ years}$$

BY: DATE:	CHECKED BY: DATE:	The Earth Technology Corporation

END
DATE
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5-88
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